JUNE 1952

WIRE AND WIRE PRODUCTS

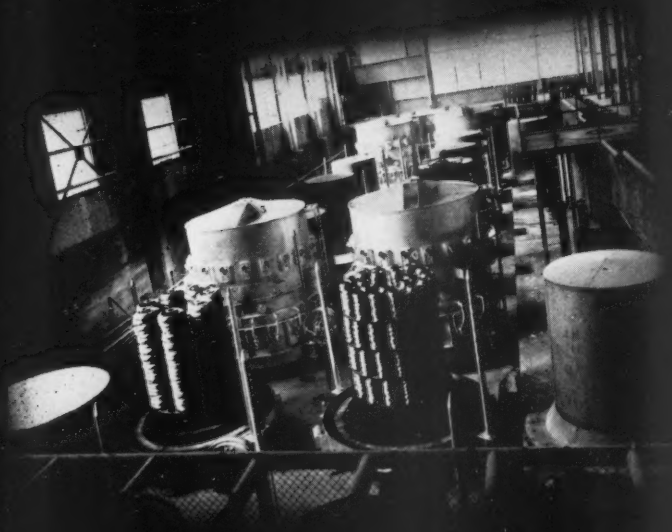
Today is the day to ask us what modern Morgan-Connor Wire Machines will do in your mill on your work!

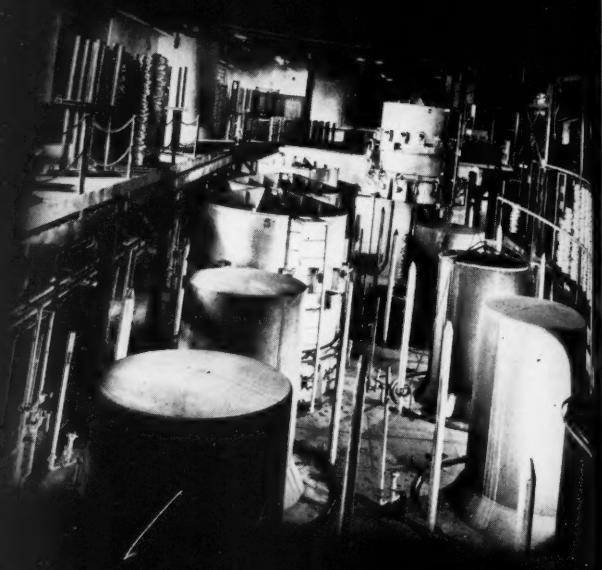
Morgan Connor Wire Machines

gan Construction Company · WORCESTER, MASS.

FICIAL PUBLICATION OF THE WIRE ASSOCIATION

WILSON WIRE ANNEALING





THESE Wilson wire annealing furnace installations are ready to contribute their share to our national defense effort.

Lee Wilson

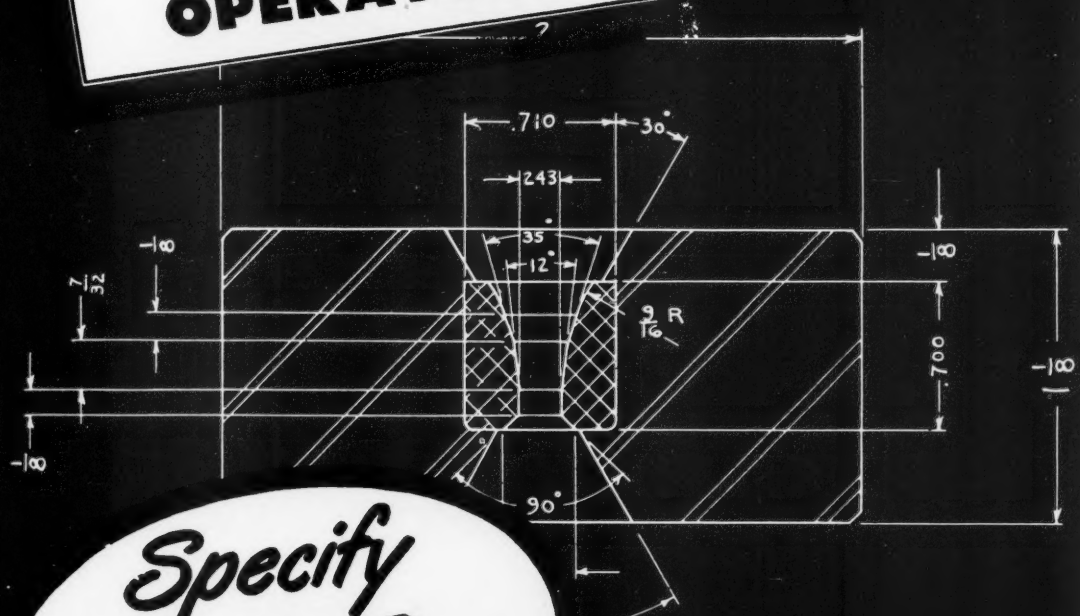
ENGINEERING Co., Inc.

20005 WEST LAKE ROAD • CLEVELAND, OHIO

Telephone ACademy 1-4670

INDUSTRIAL FURNACES ⊥ RADIANT TUBE HEATING ⊥ HEAT TREATING PROCES

Memo to: ECONOMY-MINDED WIRE MILL OPERATORS



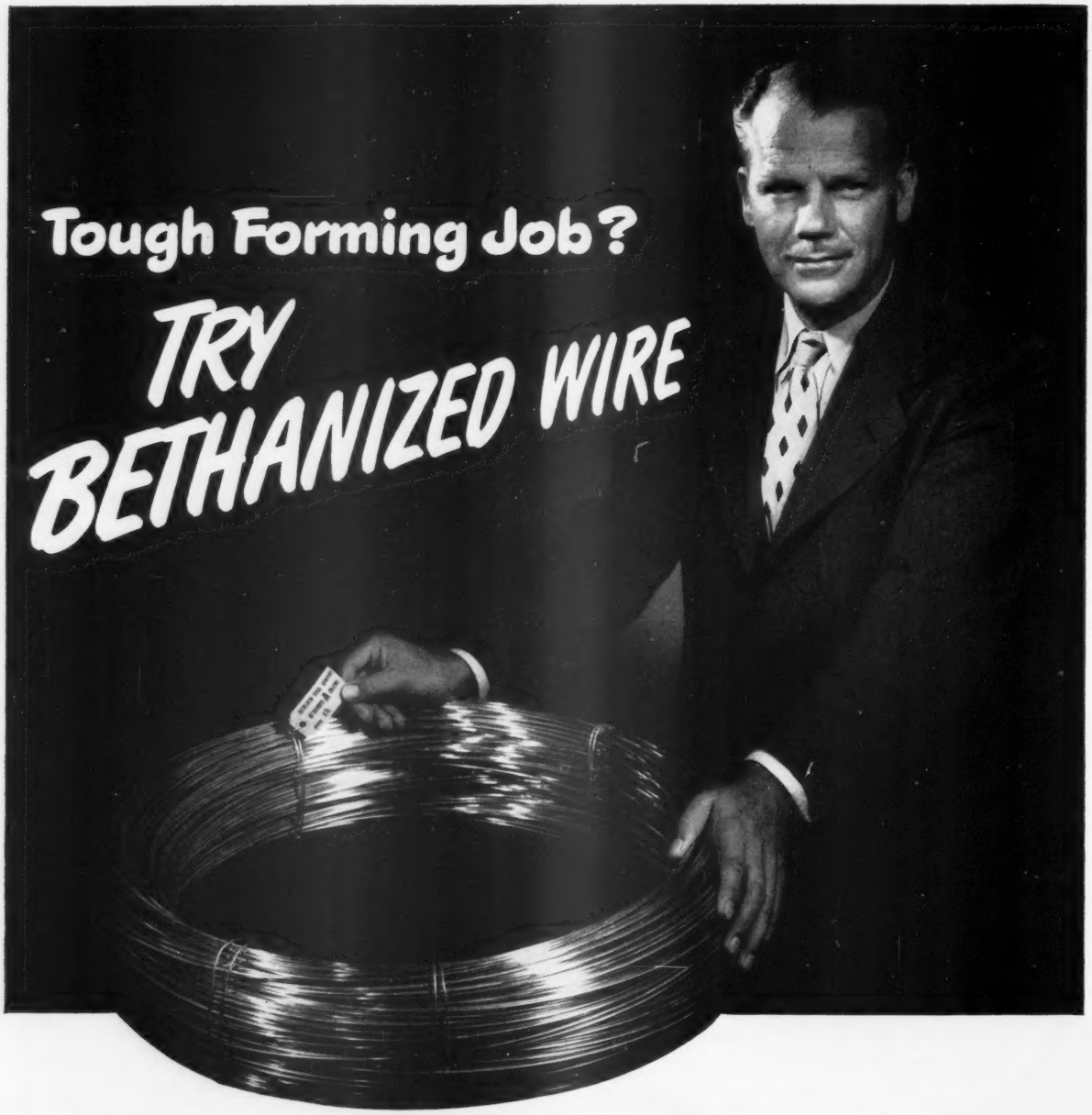
Specify Firthaloy

PRODUCTS WIRE DRAWING DIES	
FOR: WIRE DRAWING DIVISION	
SIZE R-6 FINISHED	HOLE .243
SPECIFY FIRTHALOY	
DRWG APVD [illegible]	DATE [illegible]-51
RVSNS NONE	

R-225

Firth Sterling
INCORPORATED

DETROIT • DAYTON • CLEVELAND • HARTFORD
NEW YORK • CHICAGO • PITTSBURGH
PHILADELPHIA • LOS ANGELES • BIRMINGHAM



Searching for wire that can take punishment—wire that can stand severe fabrication without losing its smooth good looks or its ability to fight corrosion?

Wire fabricators who have tried bethanized wire know the answer. They like the way this high-grade wire comes through the toughest forming jobs—spiral-woven conveyor belts, brush handles, chains—with its bethanized coating perfectly intact.

Here's proof of the ductility and tight adherence of the bethanized coating. The wire can be bent, twisted, wrapped around its own diameter—even drawn to fine gage—without damage to the zinc armor. Bethanized coating is uniform, too. Rust finds no inviting thin spots anywhere along the wire.

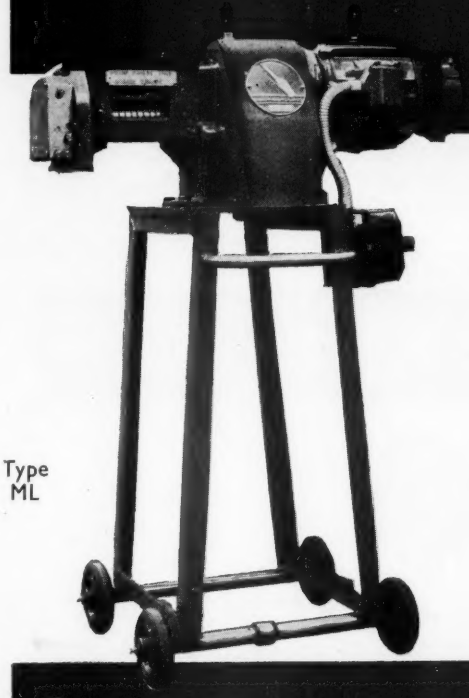
Next time you have a difficult forming job, try bethanized wire. If you'd like more information, get in touch with the nearest Bethlehem sales office, or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

Pointing Machines for all Wire Drawing Needs

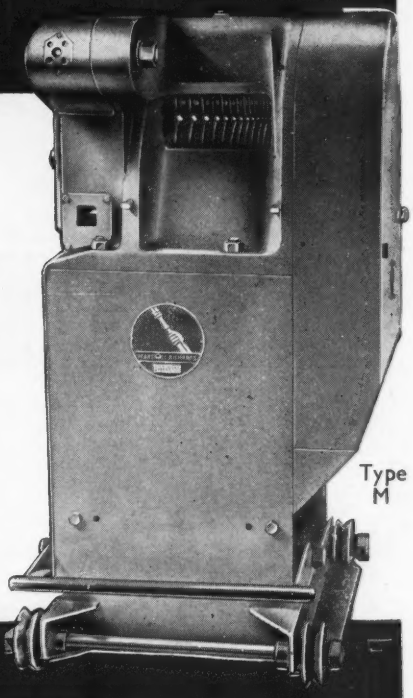


Type ML

The power pointers here illustrated and specified cover the requirements of most wire mills.

The rolls are of the type which push the inserted wire towards the operator, rolling a tapered point whilst doing so.

Cropping shears may be included if required.

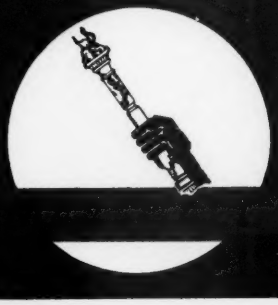


Type M

TYPE	DIAMETER OF WIRE TO BE POINTED		MOTOR H.P.
	Maximum ins.	Minimum ins.	
M 3	.600	.275	3
M 2	.400	.072	2½
M 1	.320	.056	2½
M L A	.260	.072	1½
M L B	.220	.064	1½

NOTE Capacities given above are for high tensile metals. For copper and pure aluminium, capacities can be increased as follows:—

M2	Max.	·600"
M1	Max.	·400"
M L A	Max.	.300"
M L B	Max.	.260"



RICHARDS MACHINE CO. INC.

1100 SOUTH BROAD STREET · TRENTON 10 · NEW JERSEY
Telephone: TRENTON 9478 · Telegrams: MARICH TRENTON

ANOTHER IMPORTANT MEMBER OF WATERBURY-FARREL'S LINE OF WIRE-WORKING MACHINERY

HOW THIS WATERBURY-FARREL WINDER puts trolley wire in its place

This new Waterbury-Farrel Trolley Wire Winder has an automatic, hydraulic, spool-traversing feature that assures a very accurate lay of wire.

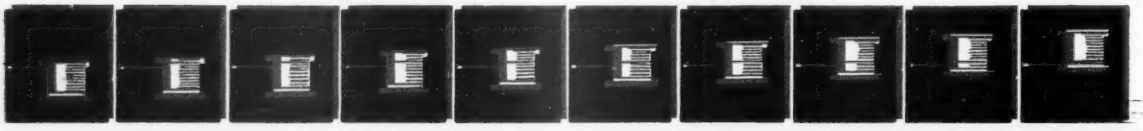
The wire moves straight ahead while the spool itself traverses. It moves across the path of the wire at exactly the right pace to put the wire precisely where it belongs on the spool. A special slip friction device compensates for the build-up of the spool.

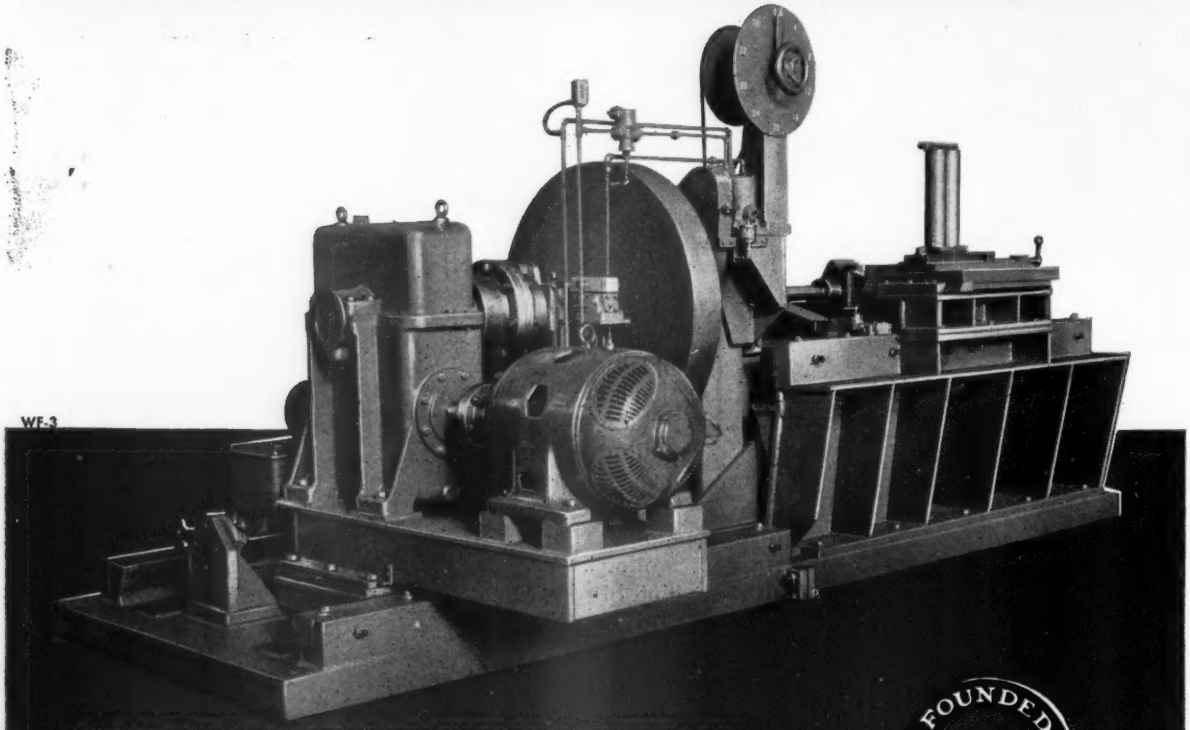
This machine can be furnished to take spools up to 56" O.D., 31" barrel with a 26" traverse. It has a maximum capacity of 7,500 lbs. of wire plus approximately 1,800 lbs. for the spool . . . a total load of 9,300 lbs.

Further information on this machine or on any of the equipment indicated below is available on request.

WATERBURY FARREL FOUNDRY & MACHINE COMPANY
WATERBURY, CONNECTICUT, U. S. A.
Sales Offices: Chicago, Cleveland and Millburn, N. J.

The spool traverses . . . the wire stays straight





WF-3

A FEW OF THE MANY TYPES OF METAL WORKING MACHINERY MADE BY WATERBURY FARREL

WIRE MILL EQUIPMENT—Continuous Fine Wire Drawing Machines • including Upright Cone and Tandem types • Bull Blocks • String-up Machines • Spoolers, Etc. • *COLD PROCESS BOLT AND NUT MACHINERY*—Headers (all types) • Re-headers • Trimmers • Thread Rolling Machines • Slotters • Nut Tappers, etc. • *POWER PRESSES*—Crank • Cam and Toggle; also Rock and Pinion Presses • Transfer Presses • Multiple Plunger Presses • Hydraulic Presses, etc. • *MILL MACHINERY*—Rolling Mills • Wire Flattening Mills • Cha'n Draw Benches • also Slitters • Straightenars • Pointers Swagers • Cut-off Saws • Coilers • Winders, etc.

FOUNDED WATERBURY FARREL 1851

In Equipment, Experience Counts . . .

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 27 JUNE, 1952 No. 6

Designated as Official Publication By The Wire Association

Contents

Editor's Desk 563

Electrotinning Copper Wire: A New Process
Part II—The Machine
by C. O. Bruestle 565

X-Ray Helps Produce Better Wire by New Methods which Analyze Crystal Structure of Base Metals
by John Buhler 570

Coating Metal Used in Hot-Dip Galvanizing
Part III—Metal and Alloy Additions to the Galvanizing Bath
by W. G. Imhoff 575

"Teflon" Tetrafluorethylene Resin as a Wire and Cable Insulator
by B. E. Ely 579

Cable Knitting and Its Advantages
by V. L. Pinnock 583

Setting Wire Tensions with Tension Meters
by E. J. Saxl 584

Government Wire Production Information 589

Outstanding Personalities of the Wire Industry 597

A Review of Recent Wire Products 606

Index to Advertisers 635

Where-to-Buy 636-640

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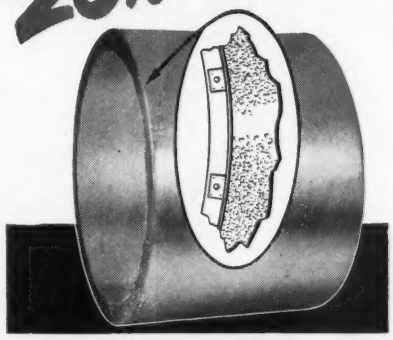
extra STRENGTH SERVICE and 20% LESS WEIGHT



NILES

"Reinforced Type"

FLANGED STEEL TRAVERSES

for wire and cable

. . . have extra strength where it is needed most—at bolt holes and base of the flange. This reinforcing makes possible the use of lighter gauge steel, saving up to 20% in weight while increasing overall strength.

Niles Flanged Steel Traverses have given as much as sixteen years' service without refinishing or major maintenance, according to actual experience records. In many cases their use has doubled the number of trips per reel before cut downs or scrapping of wooden heads.

They are manufactured in sizes up to 56" diameter and 48" traverse —in plain, painted or hot dip galvanized finishes—as light as 18-gauge steel. Width of flange and number of bolt and drain holes are furnished to your specifications. Available for prompt delivery. Write for prices.

• • •

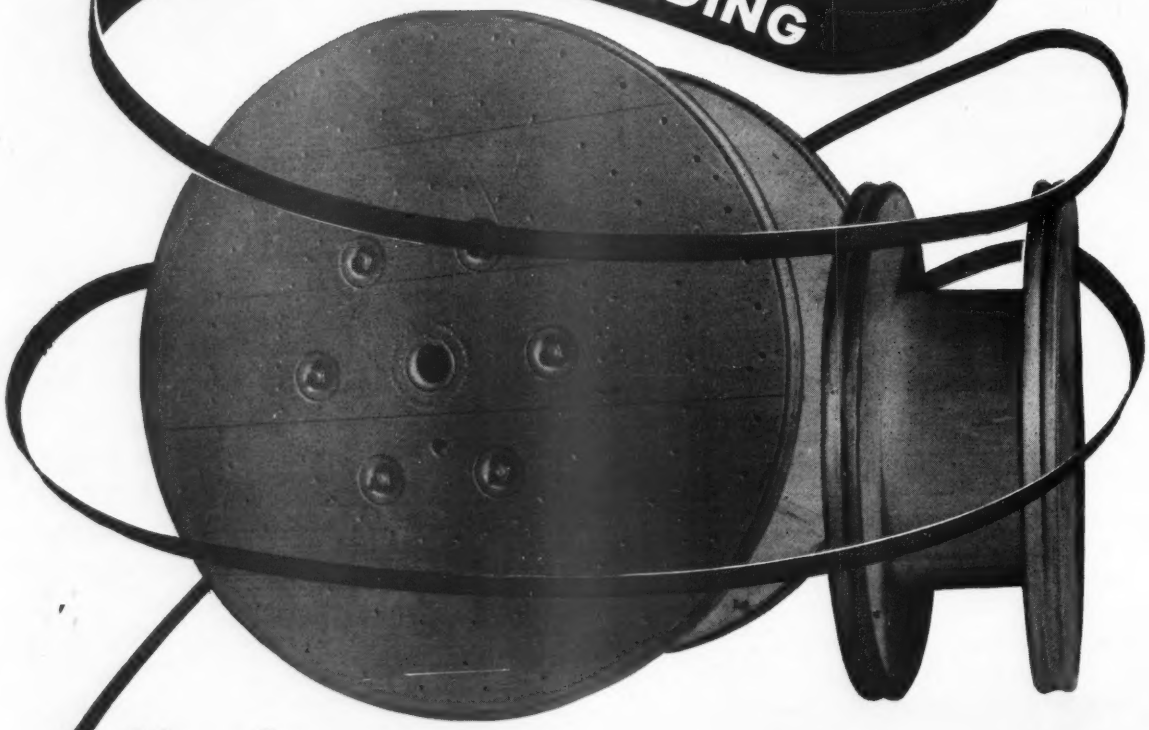
Manufactured Under License Arrangements With Western Electric Co., Inc.

REPUBLIC STEEL

NILES STEEL PRODUCTS DIVISION

REPUBLIC STEEL CORPORATION
NILES • OHIO

WRAP UP YOUR REEL TROUBLES WITH A METAL BINDING



You Can:

REDUCE REEL COSTS • INCREASE REEL LIFE and ELIMINATE REEL REPAIRS with NARCO METAL BOUND REELS

These fine, long-lasting reels will do all of the above and show savings of up to 300% in reel costs.

For example, a standard all-wood reel will average *four* trips with repairs. A NARCO METAL BOUND REEL of the same size will give you *twelve* to *sixteen* trips — with *NO REPAIRS*. And yet a sturdy, well-made NARCO Reel averages only 50% more in cost to you.

Available in 12″ through 48″ diameters. All-wood reels made from 12″ to any diameter. Shipped assembled or knocked-down, as desired.

May we quote on your requirements?

North Anson Reel Co.

TELEPHONE MADISON 187-2 NORTH ANSON, MAINE

A FACTUAL REPORT on *Drawing Stainless Steel Tubing*

PRODUCT APPLICATION REPORT

INDUSTRY Metal Working

OPERATION Drawing Stainless Steel Tubing

MATERIALS Magnus Drawing Lubricant No. 47

Account: One of the nation's largest steel mills.

Who Seen: Metallurgist. This man is responsible for the evaluation of drawing lubricants for all of the company's plants.

Operation: Drawing welded stainless steel tubing. The operation is performed on a McKay variable speed machine, using carbide dies and mandrels. Average drawing speed is 45 feet per minute. Reduction in cross sectional area of tubing is 20-35% per pass.

Metallic Material: Almost all common types of stainless steel are drawn, including Nos. 304, 316, 347, 321 and 430. Tubes are approximately 15 feet in length, with outside diameter ranging from ¼ inch to 3 inches. Wall thickness is from 12 to 18 gauge.

Former Method: Clean tubing was dipped in a proprietary solution to give it a black sulfide coating. Tubing was then rinsed and dipped into a 1-3 water solution of a well known competitive compound at 170°F. and allowed to dry thoroughly. This was accomplished by laying the tubes at a 20° angle overnight.

MAGNUS Method: Magnus No. 47 is used 1-5 with water as a direct replacement for the former compound, using the above procedure.

Comparison: The Magnus drawing compound was reported to be the finest material for stainless steel tube drawing that they have ever tried. The excellent bonding quality of the product results in unusually long die and plug life. In addition, breakage has been reduced to a minimum. The efficiency of Magnus No. 47 has made it possible to eliminate the sulfide coating on the less-difficult draws. Under their conditions of operation, they report that the Magnus material is the only product capable of drawing stainless steel tubing without an undercoating of some kind. An I.D. and O.D. accuracy of .001 inch can be maintained by their present procedure. Other advantages reported for the Magnus product are longer life of the compound, ease of removal (by hot water wash) and the absence of pigment.

Remarks: Magnus No. 47 is used on all stainless steel tube drawing at this plant and has been used on a production basis for the past six months.

If you have a problem drawing stainless steel tubing or want to improve efficiency of any other drawing operation—write or phone for information on the Magnus Line of Modern Drawing Lubricants.

MAGNUS CHEMICAL COMPANY, INC.
188 South Avenue, Garwood, N. J.
IN CANADA—MAGNUS CHEMICALS, LTD., MONTREAL
Service representatives in principal cities

MAGNUS

MANUFACTURERS OF WIRE, ROD and SHAPE DRAWING LUBRICANTS AND HEAVY DUTY CUTTING FLUIDS

Vitron Low-Twist Yarns speed insulating and cut costs

Low-Twist VITRON Yarns increase efficiency in magnet wire production, by permitting build-up control through variations in pull-out and flyer speeds. Each package serves a wide range of needs, and a sound inventory can be maintained with fewer types of packages. These savings, plus the lower cost of low-twist constructions, are cutting over-all costs in many wire processing operations.

Glass Fibers Inc. first offered low-twist in an exclusive yarn size—VITRON 300's. This program proved so successful that wire processors requested the complete range of VITRON yarns—450's, 300's, 225's and 150's—be made available in low-twist constructions.

We would like to tell you how you can save money with these important products. We can show where insulating costs have been cut as much as 20% to 40% over previously used yarns by shifting to low-twist constructions. A letter or call from you today will put our engineers at your service.

GLASS FIBERS INC.
1810 Madison Avenue • Toledo, Ohio

Vitron
ELECTRICAL INSULATING MATERIALS

Wire Trouble?

When wire twists and tangles as it uncoils, you lose production time. That's why Chase mills pay so much attention to the "cast" of Chase copper alloy wire. Uniformity of temper and stress makes Chase wire conform to the shape of the coil and unwind smoothly.

It is free from physical defects . . . uniform in gauge, texture and color. For cold-heading, Chase wire is tops. Write for folder "Chase Cold-Heading Extruded Brass and Copper Alloy Wire."

Chase Technical Service. Our metallurgical engineers are familiar with military specifications for brass and copper for ordnance components, and will be glad to consult with you on the selection of these metals for defense orders.

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• *The Nation's Headquarters for Brass & Copper*

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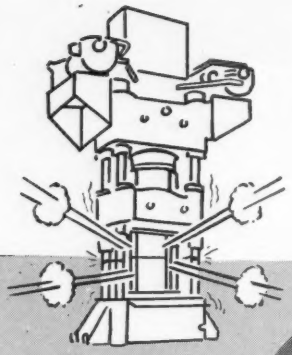
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	
Chicago	Houston†	Newark	Rochester†	(†sales office only)
Cincinnati	Indianapolis	New Orleans	St. Louis	

Tough draws are easy with Talide Dies



● As a production man, you know of the trouble-free, phenomenal results with Talide Carbide Dies on runs up to a million or more pieces. Long, uninterrupted service life—20 to 50 times greater—makes Talide Dies less expensive than steel dies. Many draws today would be impossible without carbide dies. Pickup, scoring or scratching is eliminated.

A lustrous surface finish results, adding greater sales appeal to your product.

Whether your problem involves a deep draw, tough draw, or a heavy draw—they are all easier with Talide Dies.

You can obtain Talide Dies in sizes from pinpoint to 24" diameter and in many complex shapes.

SEND FOR DIE CATALOG 50-G

METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN, OHIO

METAL CARBIDES CORPORATION

YOUNGSTOWN 7, OHIO

SINTERED CARBIDES • HOT PRESSED CARBIDES

CUTTING TOOLS • DRAWING DIES • WEAR RESISTANT PARTS

OVER 25 YEARS EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

for economical production use

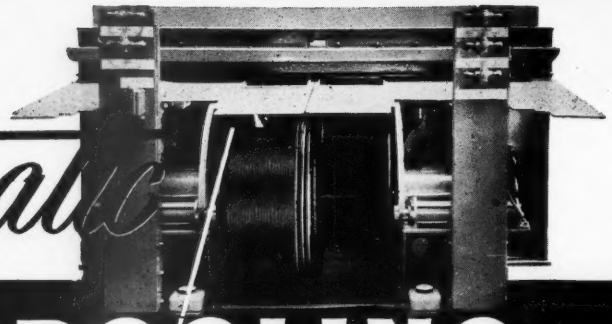
Pittsburgh Special Shape Wire

For nut making and special fabricating you will find that Pittsburgh square, hexagonal, octagonal and rectangular wire works smoothly in your machines—makes for efficient economical production. It has the inherent, consistent quality of all Pittsburgh Wire to give you a sound product. For information on how to order write Pittsburgh Steel Company, Dept. WWP, Grant Building, Pittsburgh 30, Pa.

Pittsburgh Wire

A product of **PITTSBURGH STEEL COMPANY**

Continuous SPOOLING...

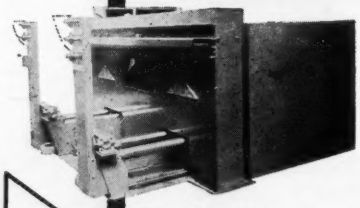


NO SHUTDOWNS

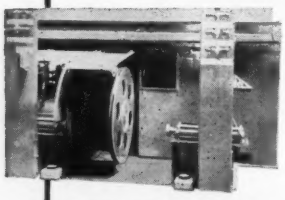
NO SLOWDOWNS

for...ALUMINUM and COPPER wire

Absolutely no shutdowns or slowdowns at operating speeds for EC ALUMINUM and COPPER wire drawing machines . . . and adaptable to your existing equipment — either Syncro or others. Handles standard reels up to 30" diameter maximum and for either hard or soft EC aluminum or copper wire in a range of sizes from ⅛" and finer. Its exceptionally fine adaptability to aluminum and copper drawing is at present of widespread interest to the wire industry. Are you "in the know" concerning this pioneered and better developed Syncro spooling improvement? We believe, without question, it is the best on the world's market. Feel free to call on us without obligation to explain to you how its many practical applications can reduce costs and increase profits!



Directly above: view shown during operation.



Wound spool ready to be replaced with empty spool. Another spool inside is still spooling without stop.

- successive starting shock loads eliminated!
- pre-determined package weights assured!
- maximum speed and spool capacity!
- no spool change-over shutdowns!
- PROVED superiority!
- safer!

FURTHER DETAILS OF THIS ADVANCED IMPROVEMENT AVAILABLE ON REQUEST

SYNCRO®

MACHINE COMPANY

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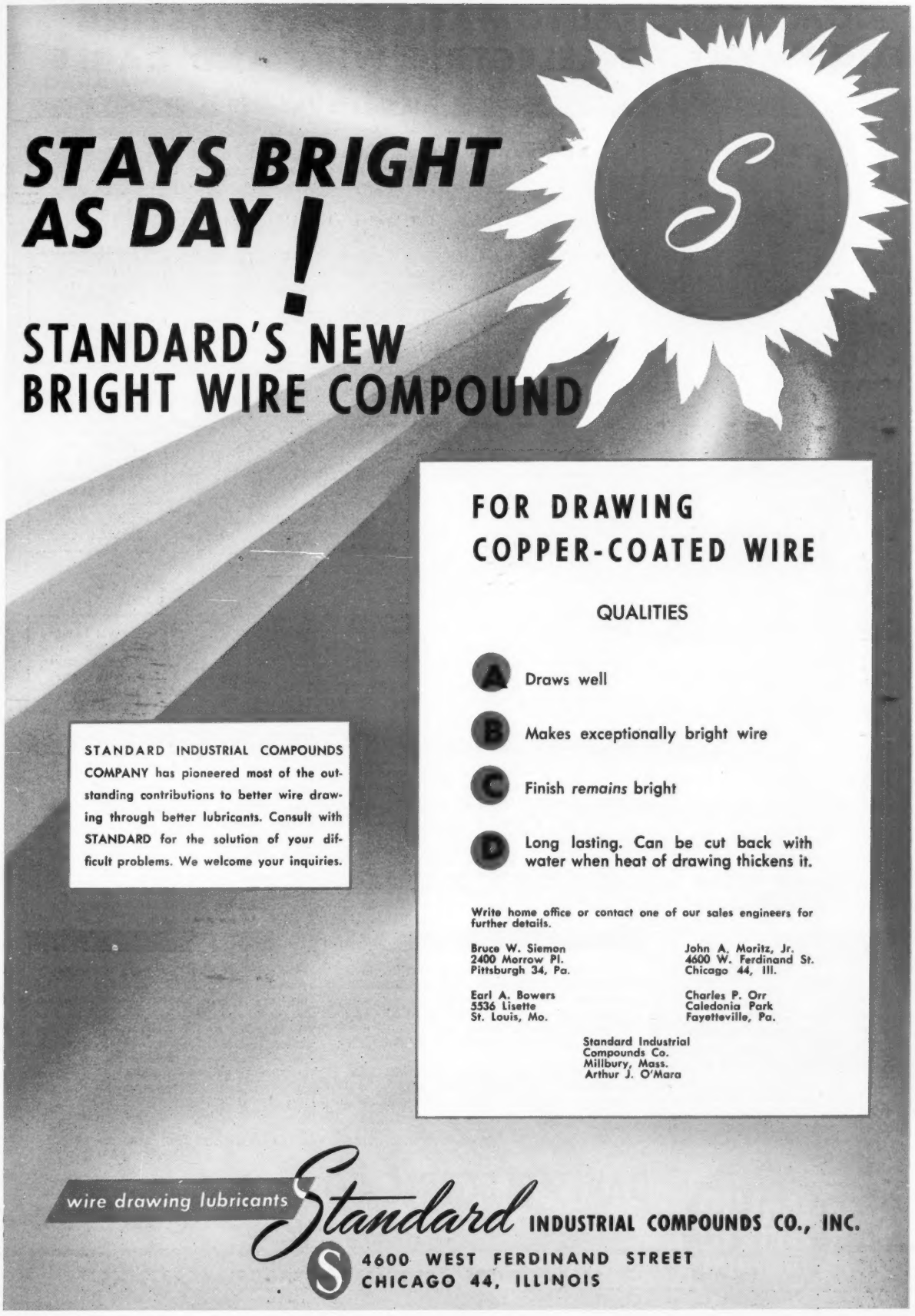
Machinery for the Wire Industry AFFILIATED COMPANY: WINGET-SYNCRO, ROCHESTER, KENT, ENGLAND


STAYS BRIGHT AS DAY!
STANDARD'S NEW BRIGHT WIRE COMPOUND
FOR DRAWING COPPER-COATED WIRE
QUALITIES
A Draws well
B Makes exceptionally bright wire
C Finish remains bright
D Long lasting. Can be cut back with water when heat of drawing thickens it.
STANDARD INDUSTRIAL COMPOUNDS COMPANY has pioneered most of the outstanding contributions to better wire drawing through better lubricants. Consult with STANDARD for the solution of your difficult problems. We welcome your inquiries.
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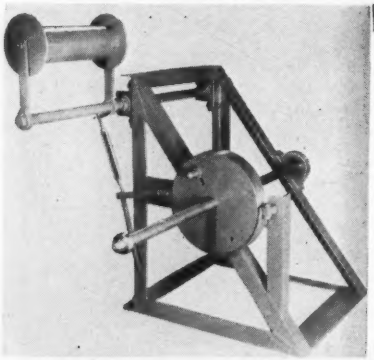
Standard INDUSTRIAL COMPOUNDS CO., INC.
4600 WEST FERDINAND STREET
CHICAGO 44, ILLINOIS

COMPLETELY AUTOMATIC SPARK TESTING EQUIPMENT FOR ELECTRIC WIRE AND CABLE



THE DAVIS PAY-OFF

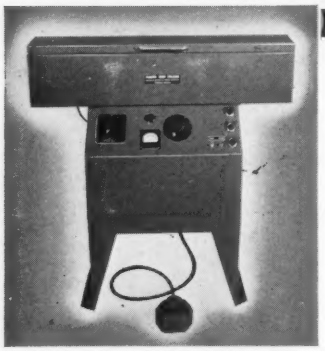
The **DAVIS PAY-OFF** is of simple design and rugged construction. Tension and braking are controlled automatically, so that over-travel of wire is prevented. It will stop instantaneously when the wind-up spool stops.

Equipped with self-aligning ball bearing pillow blocks to reduce friction and prolong the life of the mechanism.

While designed primarily for use with **DAVIS SPARK TESTERS,** this versatile machine may be used in other operations in your mill where pay-offs are needed. Will give years of dependable service.

Pay-off stands are designed for right or left. Also in shaft sizes of 1¼" or 1½". Will accommodate reel sizes up to 30" in diameter and 16" wide.

ALL DAVIS ELECTRICAL EQUIPMENT MEETS UNDERWRITERS APPROVAL



THE No. 4 SPARK TESTER

This No. 4 unit and bead chain electrode combined with a Davis Pay-off stand, a Davis Take-up, and a predetermining counter, makes a complete Respooler and Resparker.

This complete unit will Spool Test wire up to 1200 feet per minute. It automatically shuts off when the reject is found by the sparker and also when the predetermined amount of wire has gone through the counter. Footage can be increased by lengthening the electrode. The unit can also be designed to produce constant footage. Listed below are the standard bead chain type electrodes and their capacity:

18"— 500 feet per minute—up to 1" wire size
24"— 800 feet per minute—up to 1" wire size
36"—1200 feet per minute—up to 1" wire size

This Davis spark tester is so thoroughly engineered, it will, if instructions are followed, detect 99% of all faults in the insulation.

This unit can also be obtained in voltages up to 30,000. Electrodes can also be obtained to accommodate up to 2" cable.

DAVIS SPARK TESTER OPERATES ON 110 VOLTAGE

220-440 MOTOR VOLTAGE ON ALL DAVIS EQUIPMENT —OTHER VOLTAGES MAY BE HAD TO MEET YOUR SPECIFICATIONS.

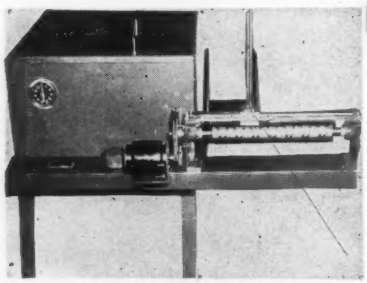
THE DAVIS PAY-OFF AND TAKE-UP IS BUILT FOR EITHER LEFT OR RIGHT HAND SHAFT.

COUNTER

The Davis predetermining counter is noted for its ease of setting and its accuracy. Mounted on its own pedestal, it can be easily moved for the convenience of the operation.

Wire size .010 to ½" also available in heavy duty model—wire capacity 3/16" - 1½" cable.

When used on a spark testing unit, its built-in switch immediately shuts off the power to your spool take-up or predetermined counter when any desired amount of wire has passed through it.



TAKE-UP

A versatile variable speed, constant tension, motor-driven mechanism that is electrically controlled.

Designed for use with the **DAVIS SPARKER,** it has nevertheless many other applications where fast and accurate lay-winding are desired.

This Take-up is equipped with an adjustable traverse that will accommodate reels up to 16 inches in width and 30 inches in diameter, with shaft sizes of 1¼" or 1½" in diameter.

The electrically controlled brake is completely automatic.

Your wire may be layer-wound by adjusting the spindle speed to correspond with that of the traverse. An automatic torque control starts the machine smoothly and slowly to prevent the breaking or stretching of wires.

The Davis Take-up unit is designed for adjustable speed ranges of 75 to 300 F.P.M. or 75 to 1200 F.P.M. A built-in tachometer indicates the speed.

TRAVERSE MOTOR 110 VOLTS—OTHER VOLTAGES MAY BE HAD TO MEET YOUR SPECIFICATIONS

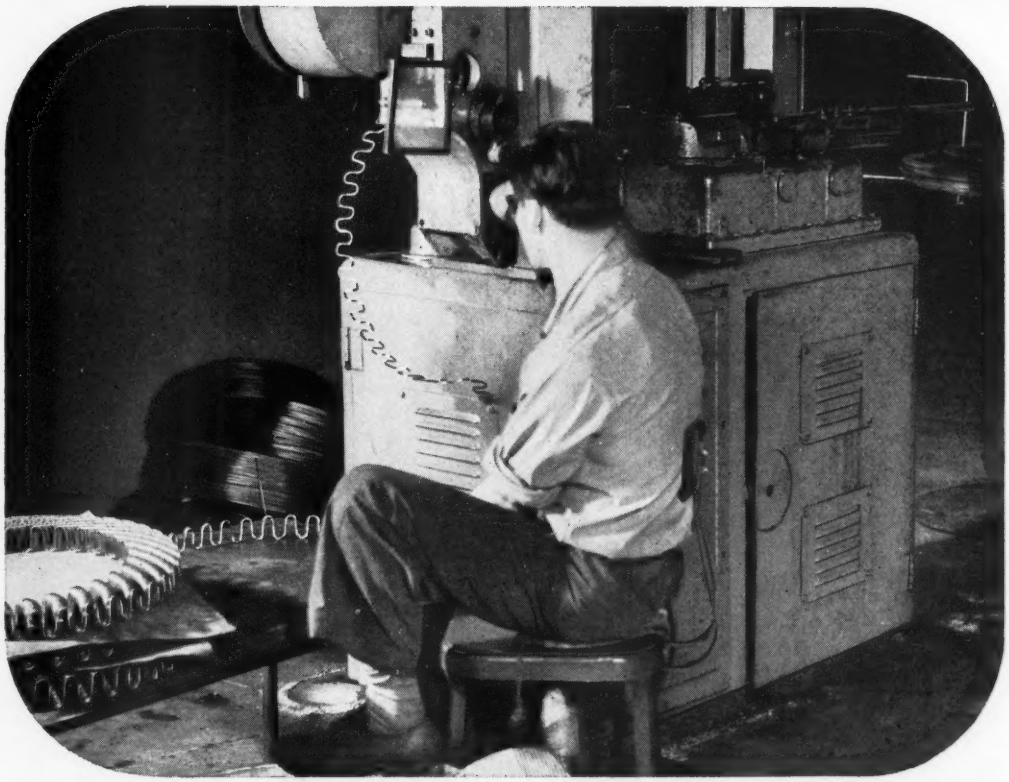
DAVIS EQUIPMENT

DAVIS ELECTRIC CO. WALLINGFORD, CONN., U.S.A.

HARNESS TESTERS • PAY-OFFS • TRAVERSES

SPARK TESTERS • SPOOLERS • TAKE-UPS • CAPSTANS

SPRING WIRE



For uniform quality, we're sure this spring wire is the best we've ever made

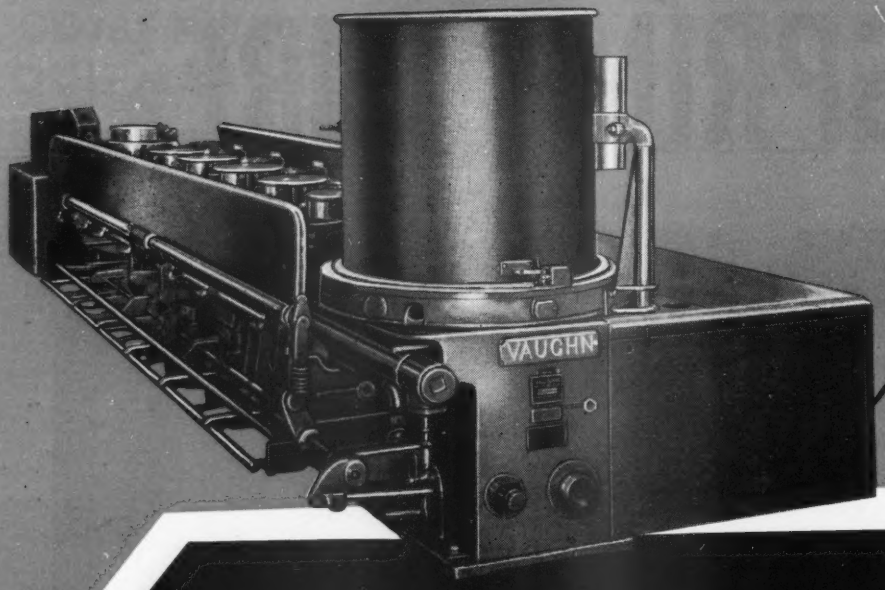
ROEBLING is about the largest specialty wire manufacturer in America. And with progressively improved facilities and more positive controls we are constantly turning out wires with a higher uniformity of gauge, finish and mechanical properties.

Among these products that save preparation time and boost production for users are mechanical spring wires including hard drawn, soft, annealed or oil-tempered M.B., H.B. and Extra H.B.; music wire; upholsterers' spring wire and valve spring wire... all in a full range of physical properties and finishes.

Large quantities of Roebling specialty wire are required in the defense program. We will always do our best, however, to meet your delivery needs. John A. Roebling's Sons Company, Trenton 2, N. J.

ROEBLING

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 701 ST. CLAIR AVE, N. E. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.



Complete Guards for all Blocks . . .

an Electric Eye for Automatic Full Bundle Stop . . .

Now Available on all Latest Type

Vaughn® MOTOBLOX®

"Quick on the Draw!"

THE VAUGHN MACHINERY CO.

Cuyahoga Falls, Ohio, U.S.A.

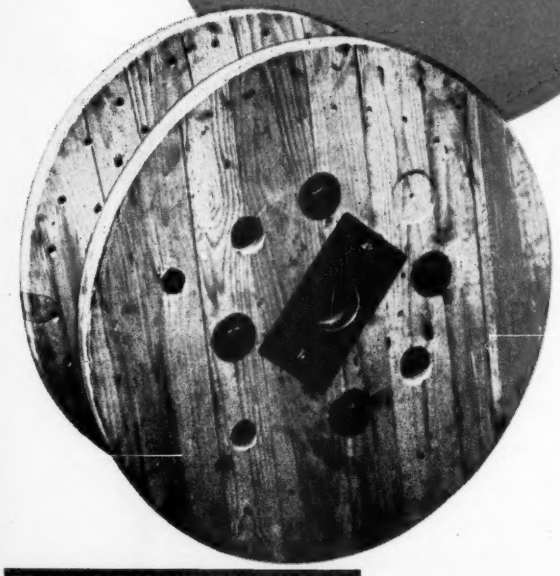
COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Blocks . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

NOTHING BUT REELS ARE MADE BY BRIDGE

Above: First step in forming reel heads

WOOD REELS for CABLE • ROPE • WIRE

12" to 96" in diameter. Knocked down or assembled. Returnable or non-returnable. Reel heads for steel drums.



KEEP YOUR MILL SUPPLIED BY A REEL SPECIALIST

It will assure you of sturdy, strong, precision-made reels of highest quality. Our straight-line production methods make reels for you at the lowest possible cost.

Every operation is automatic, with specially designed tools and jigs that produce reels to your own specifications that you can depend upon for satisfactory service.

PLUS A SPEEDY SHIPPING SERVICE

Bridge delivers by truck to your door within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

BRIDGE
MANUFACTURING CO.
HAZARDVILLE, CONN.
Phone Thompsonville, 3375

Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.

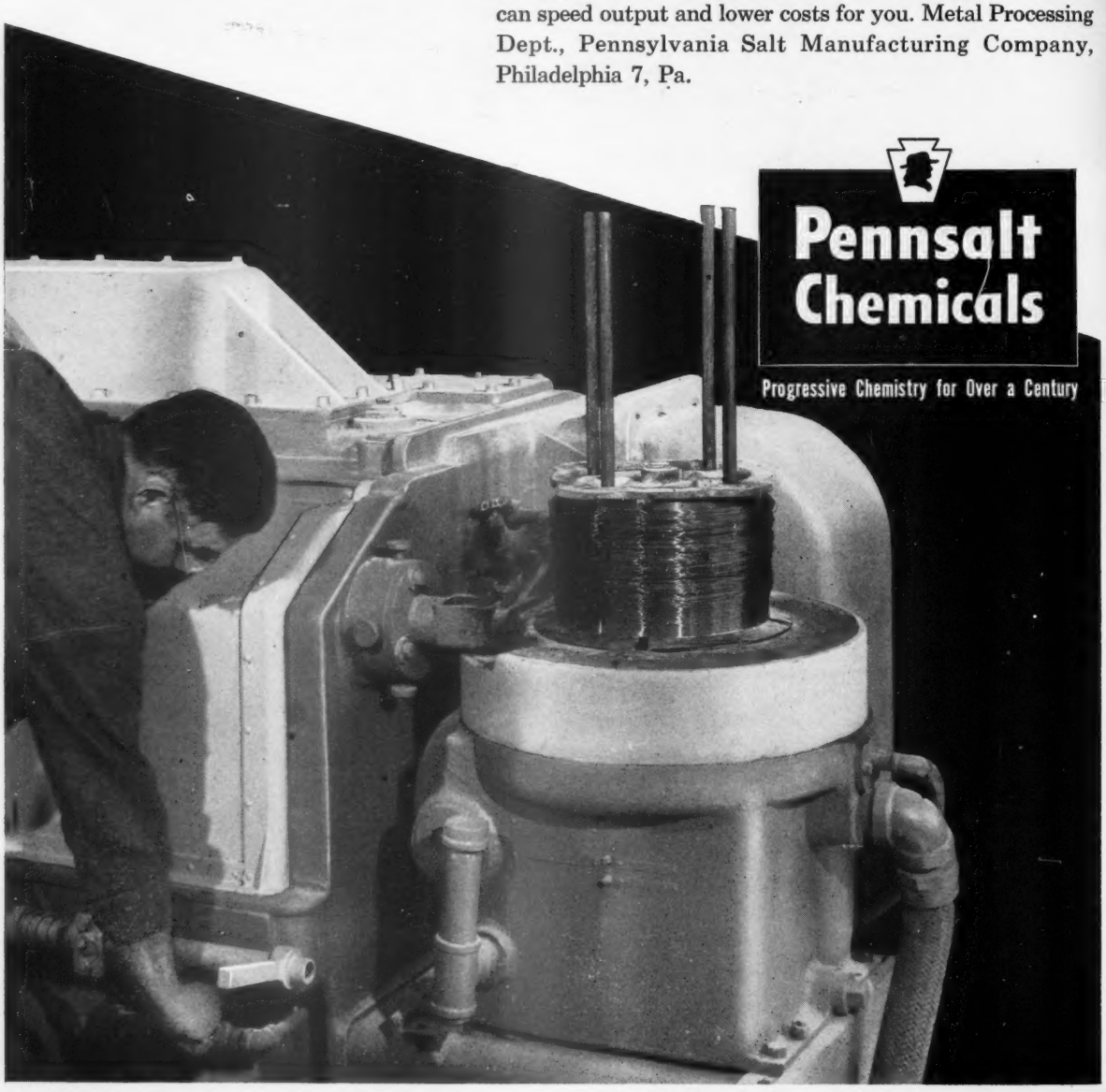
SUPERIOR-FINISHED WIRE AT MUCH HIGHER SPEEDS WITHOUT EQUIPMENT CHANGEOVER

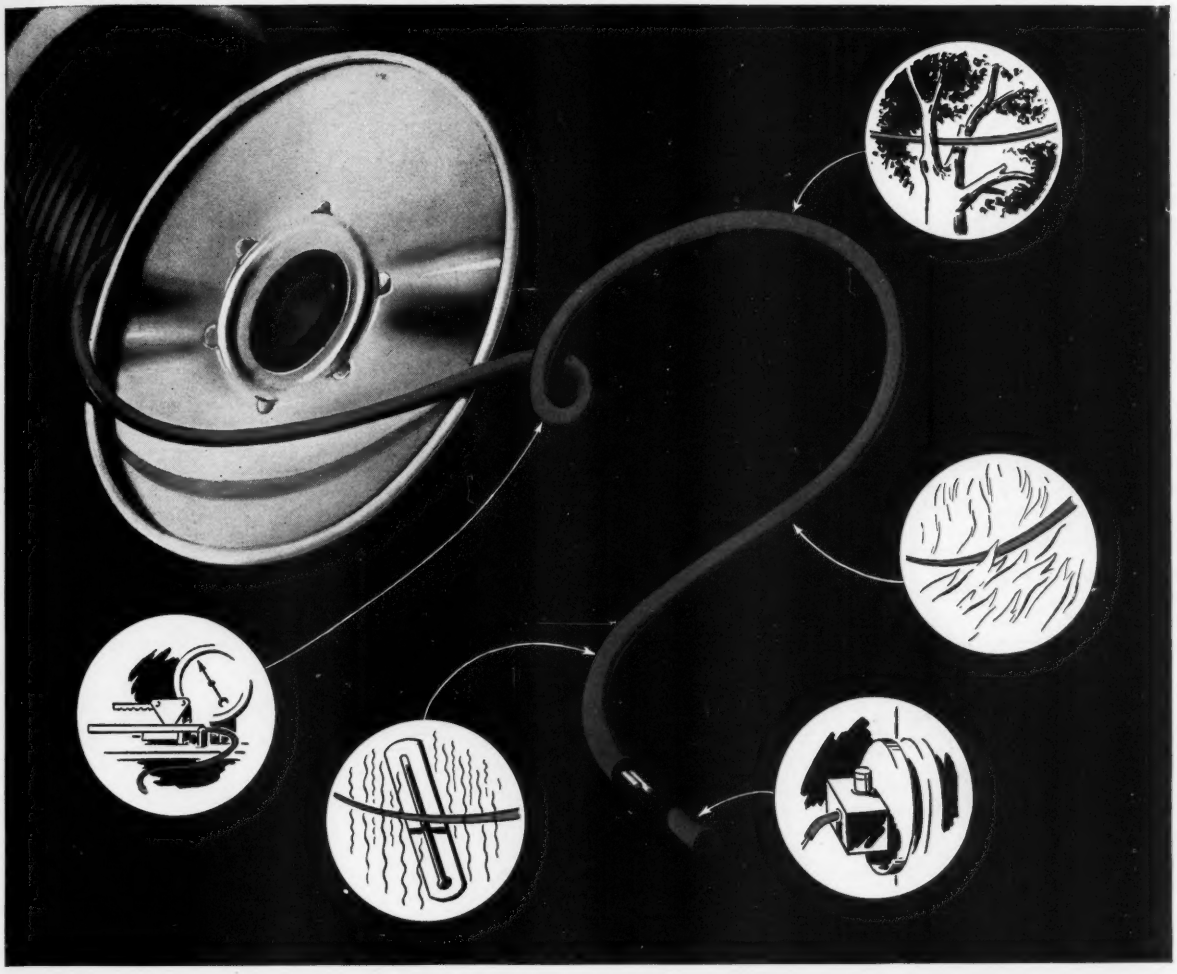
Fos Process Increases Die Life, Increases Production up to 40%

Now—with the new Pennsalt Fos Process—you can turn out uniform fine wire with a rich satin finish. You can increase wet-wire drawing speeds to the limit of your machines' capacity . . . boost your production as much as 40%. You can increase the life of dies . . . get far greater corrosion resistance in the finished wire . . . eliminate high temperature baking operations.

And all this without equipment or process flow change! The Pennsalt Fos Process consists of compatible pickling, phosphate coating, rinsing and lubrication. In all probability, the Fos Process can be applied to *your* wet-wire drawing operations merely by changing the contents of your tanks.

Investigate the Fos Process now. Write about your operation on your company letterhead, and we will be glad to give specific recommendations, showing how the Fos Process can speed output and lower costs for you. Metal Processing Dept., Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.





Why doesn't somebody make...

rigid vinyl wire insulation like this?

- Resists elevated temperatures
- Gives exceptional dielectric properties under all conditions
- Virtually eliminates cold flow
- Offers outstanding resistance to abrasion and cut-through
- Has unusual resistance to flame, moisture, and chemical action
- Flexes easily, allowing tight 180 degree bend without fracturing
- Is extruded on conventional equipment

Somebody does! Yes, Naugatuck Chemical, with the unusual protective and insulating qualities of its Marvinol rigid vinyl compounds, is bringing new scope and efficiency to the entire field of electrical design and insulation.

This unique combination of properties that **unplasticized** Marvinol compounds offer, plus their important weight and space savings, make them particularly well suited for such electrical applications as telephone frame wires and conduits.

For full technical information on this unusual Marvinol vinyl insulating material, **write today to the address below.**

Names of fabricators on request.

Naugatuck Chemical Division of **United States Rubber Company**

266 ELM STREET, NAUGATUCK, CONNECTICUT

Branches: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • In Canada: Naugatuck Chemicals, Elmira, Ont.

MARVINOL® vinyl resins • KRALASTIC® styrene copolymers • VIBRIN® polyester resins

Rubber Chemicals
Aromatics
Synthetic Rubber
Agricultural Chemicals
Reclaimed Rubber
Latices

In selling wire drawing lubricants...

...in playing golf...

it's the FOLLOW THRU *that counts!*

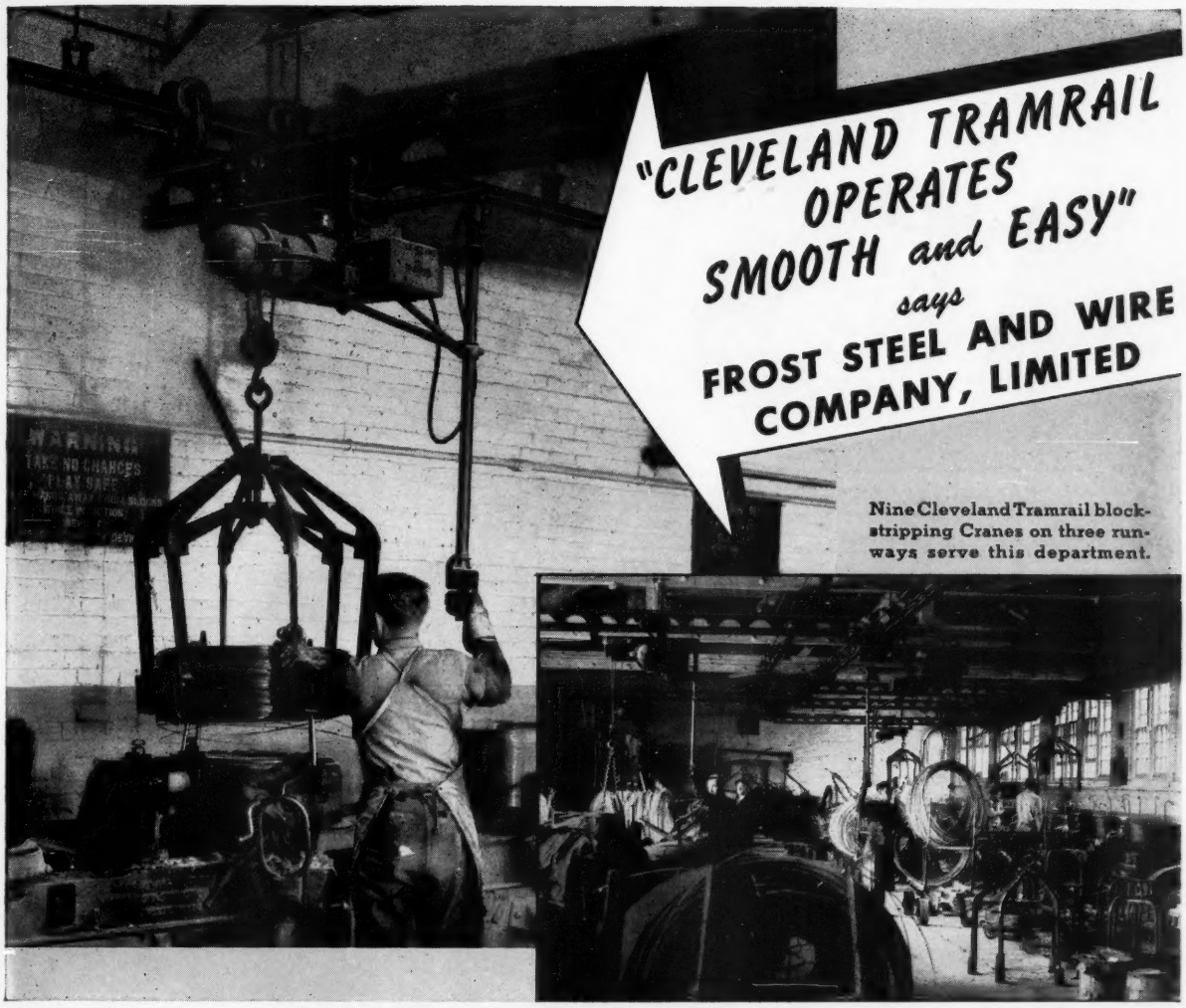
Naturally, you want to buy a quality product. You're *assured* of highest quality with Steelskin wire drawing lubricants—famous for consistent quality that results in improved die life . . . lower costs . . . superior wire products. And with Steelskin, you're assured of FOLLOW THRU . . . that extra ingredient which makes Steelskin your best lubricant buy! Steelskin salesmen are trained to follow thru with extra service, trained to trouble-shoot on the job in the interests of better service to our customers!

Yes, in golf, or in buying wire drawing lubricants, FOLLOW THRU *is* important. You get it with Steelskin!

WRITE for information on Steelskin today.

Steelskin LUBRICANTS

R. H. MILLER
Company, Inc., Homer 1, N. Y.


"CLEVELAND TRAMRAIL OPERATES SMOOTH and EASY"
says
FROST STEEL AND WIRE COMPANY, LIMITED
Nine Cleveland Tramrail block-stripping Cranes on three runways serve this department.

External Block Stripping and Wire Handling Speeded

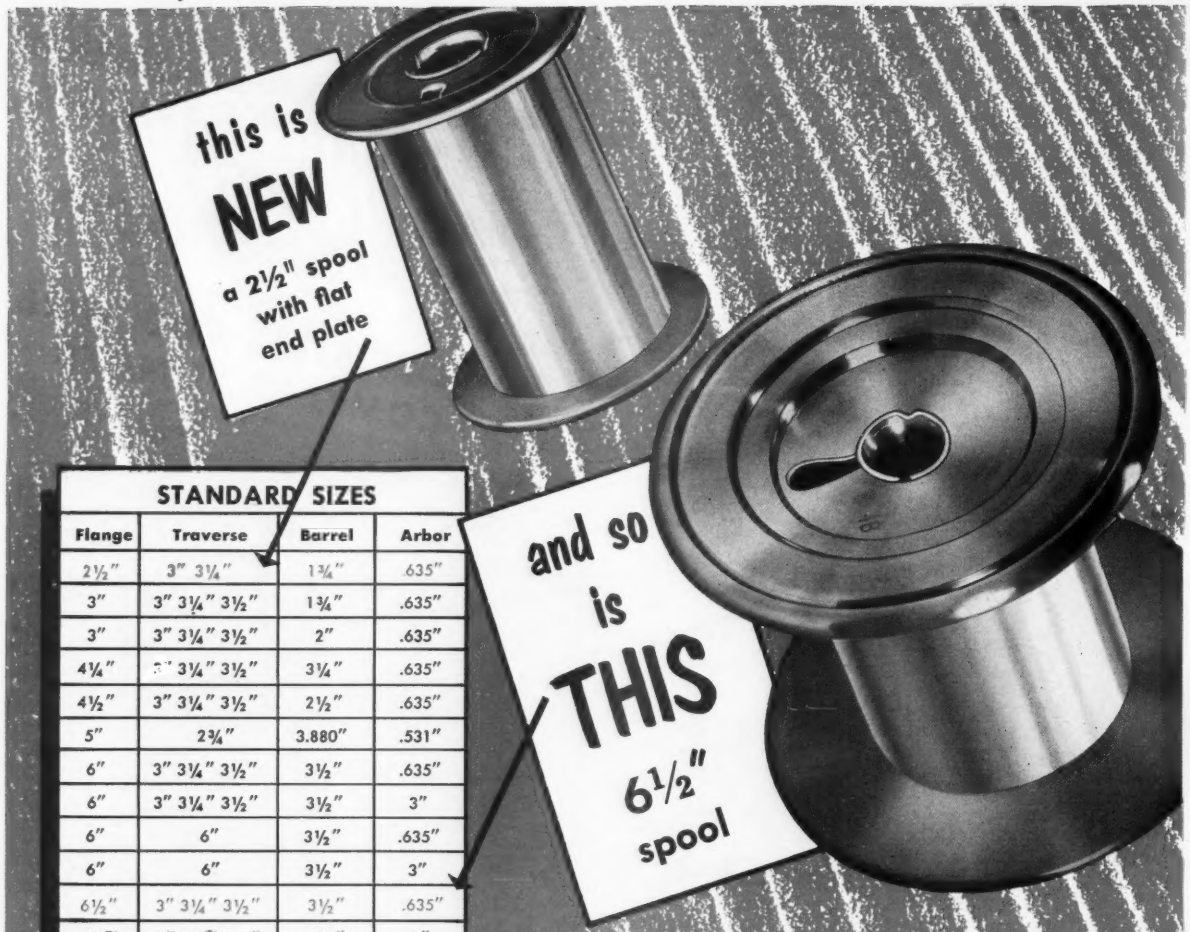
Like so many other companies, Frost Steel and Wire Company, Limited, Hamilton, Ontario, are proud of the Cleveland Tramrail installation in their wire-drawing room. It was only after considerable experience with other overhead handling equipment in their own plant and thorough study of various equipment in other plants, that Cleveland Tramrail was chosen.

Cleveland Tramrail has fully proven itself to Frost Steel and Wire. They find it operates smooth and easy. Wire handling is safer and production speeded because heavier bundles can be stripped from the blocks in faster time. Since their original installation in 1925 they have added to their tramrail equipment many times.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
9213 EAST 288th STREET WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



STANDARD SIZES			
Flange	Traverse	Barrel	Arbor
2½"	3" 3¼"	1¾"	.635"
3"	3" 3¼" 3½"	1¾"	.635"
3"	3" 3¼" 3½"	2"	.635"
4¼"	3" 3¼" 3½"	3¼"	.635"
4½"	3" 3¼" 3½"	2½"	.635"
5"	2¾"	3.880"	.531"
6"	3" 3¼" 3½"	3½"	.635"
6"	3" 3¼" 3½"	3½"	3"
6"	6"	3½"	.635"
6"	6"	3½"	3"
6½"	3" 3¼" 3½"	3½"	.635"
6½"	3" 3¼" 3½"	3½"	3"
6½"	6"	3½"	.635"
6½"	6"	3½"	3"
7"	3" 3¼" 3½"	3½"	.750"
8"	6¼"	4"	3 33/64"
11½"	6"	7½"	Optional

Do you need special requirements?

We have the engineering experience and tool room facilities to design and make any special spool you may need.

A COMPLETE LINE OF

ACROPAK* SPOOLS

... any size you need

What's *your* spooling problem?

Too much shipping expense?

Too much maintenance cost?

Too much wire spoilage?

ACROPAK Spools are light-weight drawn Aluminum alloy. They save their cost in freight charges alone. They're tough and strong—and they make a smart-looking wire package. Pick one up, you'll see what we mean. Rigid, durable, made to last. Flanges will not toe out under pressure. Absolute assurance of uniform delivery over head of spool with minimum end breakage. They've reduced spooling costs for others —why not for you, too? Can we send you a sample?

*Reg. U. S. T. M.

ACROMETAL PRODUCTS INC.

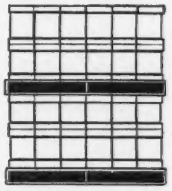
Division U. S. Bobbin and Shuttle Co., 616 Fifth Street N., Minneapolis 1, Minn.

When you ship nails—ship safely in

INTERNATIONAL'S keg-it

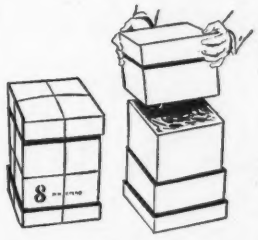
The square container tried, proved, and adopted by many of the largest nail manufacturers

This new modern fibreboard package for nails didn't come about by accident. Over three years of research and thousands of test shipments proved it to be the safe, sturdy container with many economical advantages. We would like to tell you more about it, how easily it will fit into your operation. Write us for the complete story.



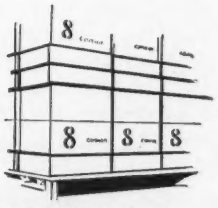
STACK IT

... Saves up to 30% of warehouse space. Readily palletized for unit load handling.



SEAL IT

... Replaceable top protects nails from dirt and weather.



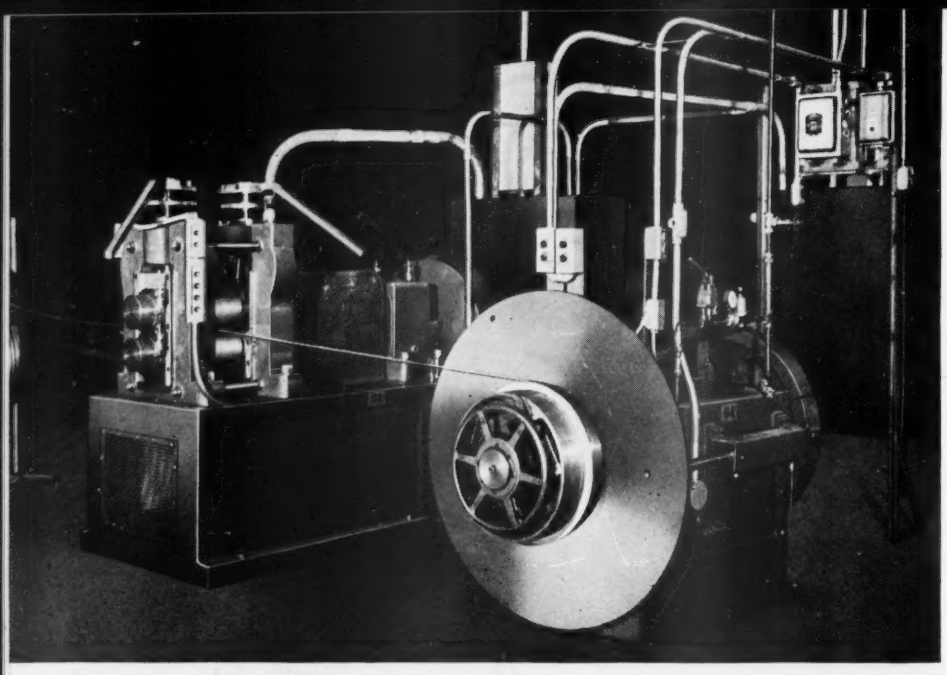
STAMP IT

... Quick, easy side marking aids identification, speeds inventories.

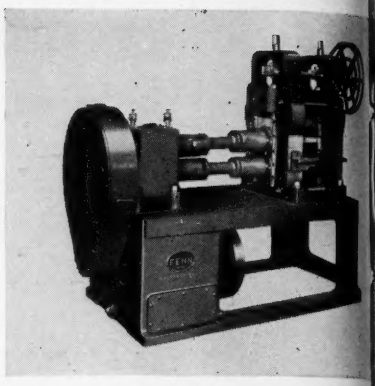
International Paper company

CONTAINER DIVISION

220 East 42nd Street, New York 17, N. Y.



THIS FENN COMBINATION, consisting of the new No. 061 Two-High Roller Bearing Rolling Mill and No. 30 Take-Up Reel, installed at Federal-Mogul's St. Johns, Michigan Plant...



GREATER ACCURACY of the new No. 061 Two-High Rolling Mill comes from heavier roll construction made possible by Fenn-designed extra-heavy precision roller bearings. Roller thrust bearings on outer bearing boxes maintain axial alignment, eliminating marks or "shadows" on the stock. Universal joint and herringbone gears provide smoother drive from motor through to rolls, for smoother finish of strip.

Reduces Inventory...Saves Maintenance

...CUTS COSTS

Federal-Mogul is one of the growing number of forward-looking firms that are making sure of an adequate supply of top-quality strip by "rolling their own."

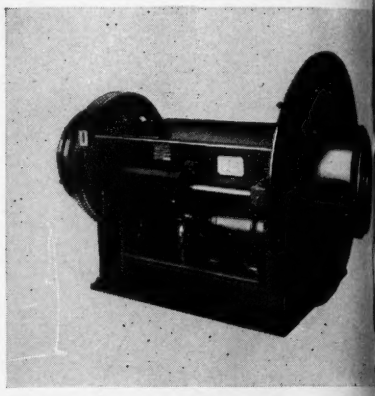
This way, they roll one stock thickness to meet many needs, thus reducing stock inventory . . . the more accurate strip they produce speeds production and saves maintenance on fabricating machines . . . and there's further economy in eliminating such "mill extras" as set-up, inspection and short run lots.

To get these benefits at their fullest, Fenn units are the obvious choice. The installation shown above, for example, is one of many typical Fenn combinations for the production of ferrous or non-ferrous strip—at top speed and lowest cost.

GET THE WHOLE STORY

Fenn Roller Bearing Rolling Mills are available in Two-High and Four-High models, with roll diameters from 4" to 16", single or tandem units, speeds up to 2,000 ft. per min. Fenn Take-Up Reels are made in a range of sizes for either traversing or "pancake" winds. For full information about their many cost-saving, efficiency-boosting advantages, contact your nearest Fenn Distributor, or write direct to

THE FENN MANUFACTURING COMPANY
1853 Broad St., Hartford 1, Connecticut



FASTER REMOVAL of finished coil is one big advantage of Fenn's No. 30 Take-Up Reel — resulting from such design-improvements as collapsing drum and hydraulic stripper. Having a capacity of 3,000 lbs. of coil, while providing a tension of 2,500 lbs., it combines with the Fenn Mills to handle up to 2,000 ft. of strip per min.

FENN

Forming metal for better and stronger products at lower cost

FENN MACHINES ARE SOLD BY:

ATLANTA
J. R. Walraven
BALTIMORE
Refer: Calco Mach'y Co., Phila.
BIRMINGHAM
Quinn & Quinn
BOSTON
Refer: C. Toolin, Providence
BUFFALO
Syracuse Supply Co.
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Neff Kohlbusch & Bissell, Inc.
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COLUMBUS
The Seifreat-Elstad Machinery Co.
DALLAS
C. J. Harter, Machinery
DAYTON
The Seifreat-Elstad Machinery Co.
DETROIT
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HOUSTON
C. J. Harter, Machinery
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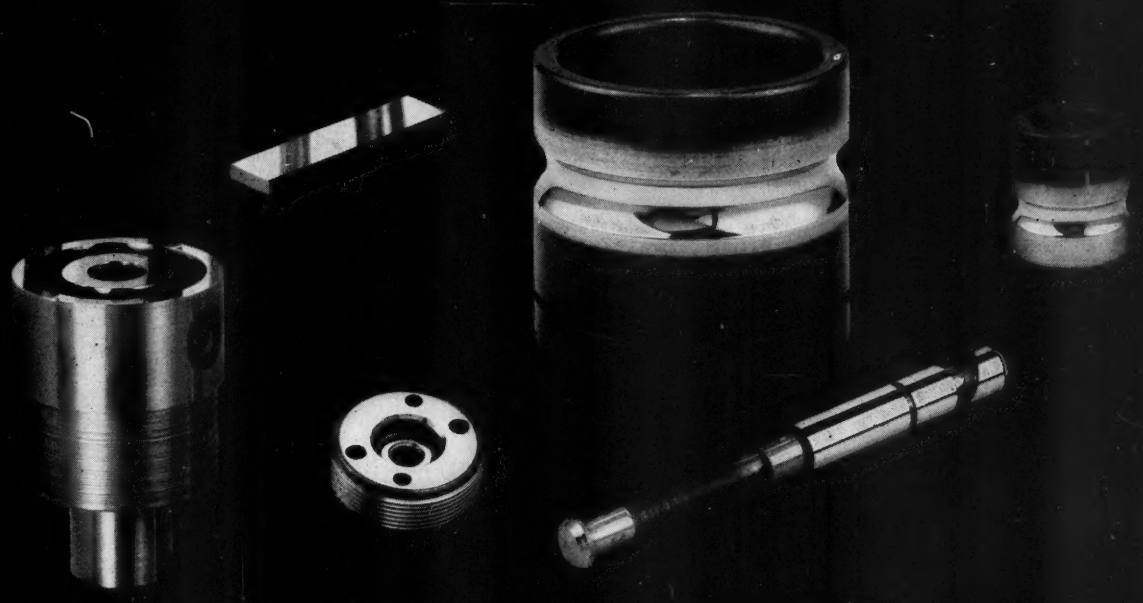
Indianapolis Machinery Export Co., Inc., New York, N. Y.



Finished with Diamond... ELGIN Diamond!

. . . IN DYMO-C FOR CARBIDES AND DYMO FOR OTHER HARD MATERIALS

From bearing races to precision hydraulic parts—from wear inserts to wire dies . . . wherever fine finish means better performance . . . you can be certain of the best with Elgin Diamond. Crushed, precision graded and combined with an exclusive color identified vehicle in DYMO, it cuts faster and assures uniform predictable results. Write today for complete information and remember, where they're particular about finish, they . . .

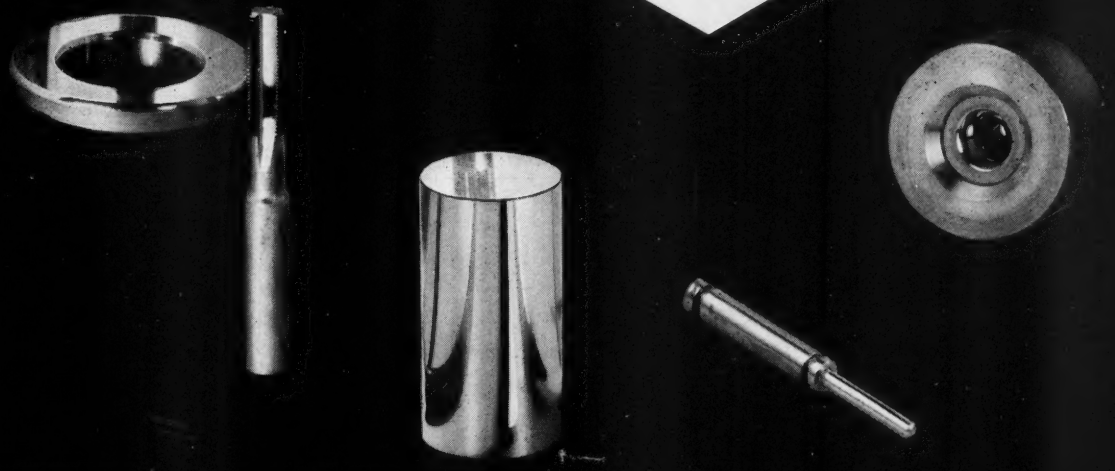
Finish with Diamond... ELGIN Diamond!

ABRASIVES DIVISION

ELGIN NATIONAL WATCH COMPANY

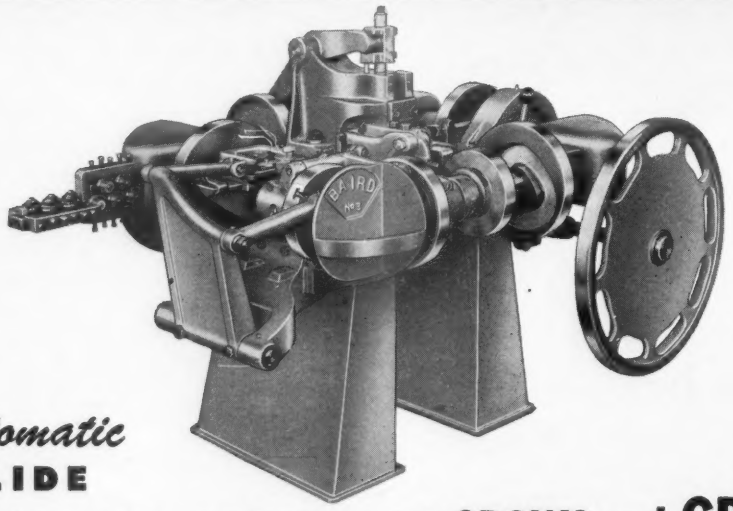
Elgin, Illinois

ELGIN DYMO



ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING



BAIRD *Automatic* FOUR SLIDE

. . . the Machine that GROWS and GROWS and GROWS

Start, if you wish, with the standard (stocked) 4-slide, which in itself is remarkably versatile in forming hundreds of articles from wire and ribbon metal.

Then when conditions demand . . . a call for either even greater versatility of production or a change in certain products . . . you may add one or more attachments to the standard model, so designed that "machine growth" is simplified and practical.

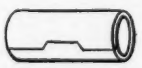
Thus, with gradual investments, you will build your Baird 4-slide to a full production unit capable of turning out the widest variety of wire and ribbon products. Here is a list of attachments easily added . . . but naturally, not all on one machine . . . as they might become too complicated.

1 Horizontal Press Attachments

2 Form Raising Attachment

3 Pin Pulling Attachment

4 Setting Attachment



5 Secondary Cut-Off Attachment

6 Nail Point (Vertical Cut-Off) Attachment

7 Vertical Forming Attachment

Baird engineers will gladly develop tooling from your parts or specification. "Ask Baird about it!"

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

4BA52

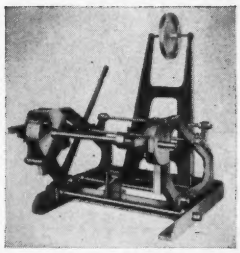
FOR FASTER, MORE UNIFORM EXTRUDING

...DAVIS-STANDARD EXTRUSION EQUIPMENT

Famous for a background of long, sound experience, Standard Machinery has engineered a line of extruding machines and auxiliary equipment that is preferred everywhere. It includes equipment for special-purpose applications.

Our equipment for *complete, continuous vulcanizing in all sizes* is outstanding for its many production advantages. Also, we design and manufacture head and stock screw units, thermo-plastic insulating equipment and other equipment for specialized jobs. Featured here are three of our finest accessory units.

Tell us your equipment needs or problems. Our engineers will cooperate with yours to give the best installation for your operation.

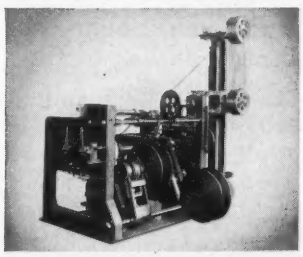


PAY-OFF

Unit is equipped to take reels up to 36" and 48" in diameter. Reel lift from floor is by cam-and-lever. Mechanism is automatically self-braking; brake is actuated by any slackening of wire speed. Rugged construction.

DAVIS-STANDARD CAPSTAN

Supplied in wide range — drag and pulling type, for almost all wire plant needs. Aluminum or cast iron drums, grooved or flat — any radii desired. Standard drum sizes 16", 24", 32", 48" and 60". Gear reducers standard, four speed transmission optional.



NEW, IMPROVED TAKE-UP OUTMODES OLD TYPES

Great, new efficiency. Noise- and vibration-free. No gears or clutches. Built to operate positively at high speeds. Reel drive by multiple double V-belts. Automatic brake. Totally new traverse mechanism. Speed range choice provided for constant tension control. For reels 6" to 36", larger sizes custom-built.

THE STANDARD MACHINERY COMPANY

14 WATER STREET MYSTIC, CONN.

MOLDING PRESSES AND EXTRUSION MACHINES

World's Largest Manufacturers of Custom-Built Extrusion Machines

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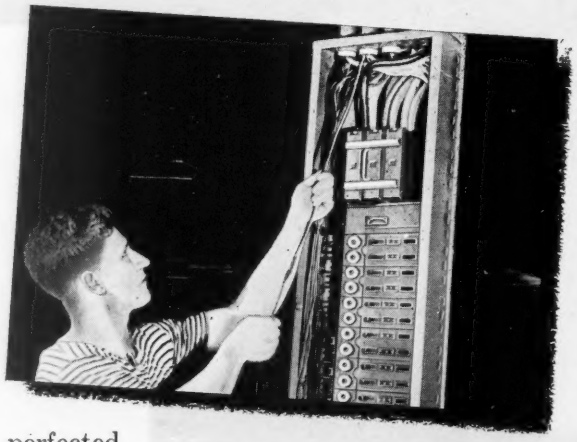
New Building Wire with Glass Braid

SMALL IN DIAMETER . . . MAXIMUM FISHABILITY

SATURATED AND FINISHED with NEWLY DEVELOPED Solar COMPOUNDS

Wire manufactured by Triangle Conduit & Cable Co., Inc., New Brunswick, New Jersey.*



This new building wire with its recently perfected covering provides superior protection and maximum flexibility. It's small in diameter, light-weight . . . easy to carry and store. The wire is tough enough to withstand tight coiling without chipping, flaking or peeling off. And it's extra smooth—neither sticky nor gritty—for maximum fishability.

The newly developed Solar compounds with which the wire is saturated and finished contribute significantly toward its versatile characteristics. The saturant and finisher, specially compounded for use over glass braid, permanently bond the individual fibers and set new standards for resistance to heat, fire, rot and moisture. In addition, the wire is painted with a Solar Soldura color solution for polarity identification and as an antistick.

Perhaps this saturant and finisher, or another of the Solar compounds or Soldura color solutions, can help you make a better product. Our laboratory facilities and technical staff are available to you without obligation. Write Solar Compound Corporation for further information.

*Trademark, "Glazon"

THE NEW SOLAR CATALOG CONTAINS:

Pictorial presentation of complete laboratory and plant facilities
Detailed description of all major testing methods
Product end uses, description and composition
Methods of application
Characteristics after application
And other valuable technical information
Catalog available to executives and technical men. Please send request for your free copy on company letterhead.

Solar Compounds Corporation
Solar Varnish Corporation
1213 WEST BLANCKE STREET • LINDEN, N. J.

TECHNICAL INFORMATION

SOLARITE KS-566 SATURATING COMPOUND

Composition: Composed of processed asphalts combined with other ingredients particularly chosen for their low susceptibility to temperature changes.

Specifications:

Softening Point—ASTM D-36-26 . . . 140° F. Minimum
Penetration @ 77° F., 100 grams, 5 seconds—ASTM D-5-49 . . . 60-75
Stormer Viscosity @ 300° F., 100 Revolutions . . . 85-110 Seconds
Specific Gravity @ 25° C.—ASTM D-71-27 . . . 1.00-1.04
Flash Point—ASTM D-92 . . . 500° F. Minimum
Fire Point—ASTM D-92 . . . 600° F. Minimum

CHARACTERISTICS AFTER APPLICATION:

Aging Characteristics: Will remain flexible indefinitely when applied under recommended, controlled conditions.

Flame Resistance: Has some flame resistance, but must be used with a flame-retardant finisher to meet Underwriters' Laboratories Standards.

Moisture Resistance: Excellent.

Low Temperature Resistance: Retains flexibility at temperatures as low as 0°F.

High Temperature Resistance: Will not cause sticking in coils up to 140° F. when used with recommended finishing compounds and anti-stick coatings.

Coverage: Estimated coverage 50% of the weight of the glass.

SOLARITE KF-561 FINISHING COMPOUND

Composition: Composed of a blend of oxidized petroleum asphalts particularly chosen for their low susceptibility. Efficient flame retarding ingredients are chemically combined.

Specifications:

Softening Point—ASTM D-36-26 . . . 220° F. Minimum
Penetration @ 77° F., 100 grams, 5 seconds—ASTM D-5-25 . . . 14-16
Viscosity, Stormer—360° F . . . 3-10 RPM
Specific Gravity @ 77/77° F.—ASTM D-71-27 . . . 1.02–1.06
Flash Point—ASTM D-92 . . . Over 500° F.

CHARACTERISTICS AFTER APPLICATION:

Aging Characteristics: Flexibility will be retained when applied as recommended.

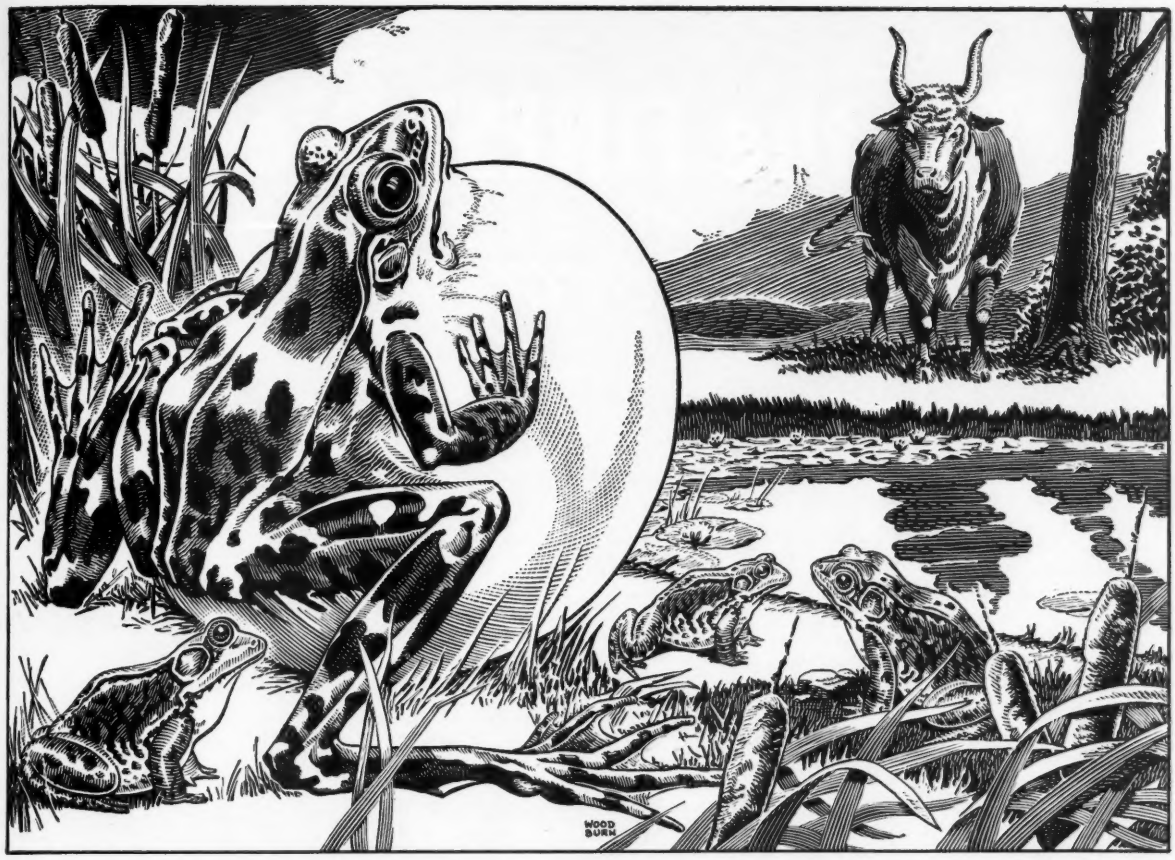
Flame Resistance: Designed to meet Underwriters' Laboratories Standards.

Moisture Resistance: Meets Underwriters' requirements when applied over saturated braids.

Low Temperature Resistance: When used with saturants recommended specifically for cold bend resistance, the finished wire may be bent around the same sized mandrels used in the moisture tests without flaking at 0° C. Solarite KS-566 is a recommended saturant. Other saturants may be employed depending upon the conditions to be met.

High Temperature Resistance: Mica or paint to be used as an antistick.

General Characteristics: Will not discolor properly formulated color solutions.



"It's foolish to try to be bigger than you are"

REMEMBER Aesop's fable of the frog and the ox? Told 2,500 years ago, it goes:

"Three young frogs cried to their mother that a little brother had been trampled by the largest beast in the swamp. 'Oh, no,' said the mother, 'no beast is larger than I.' And she blew herself up to show how big she really was. 'But it was much bigger,' the little ones chorused. Whereupon the vain mother inflated herself until she burst." And the moral was, "It's foolish to try to be bigger than you are."

Aside from the wisdom of the fable for each of us individually, there is solemn warning for us as a nation. Some among us seem to believe that with an unlimited supply of taxpayers' dollars America can buy anything--ease and security at home, acceptance of our ideas abroad, friendship of other peoples, even world peace.

Like the vain frog, America inflates herself more and more dangerously, trying to stretch herself to be the biggest thing in the swamp. Meanwhile the enormous beast that is the world goes its own way, scarcely affected by the vainglorious display of America's inflation. It's the same old world that was indifferent before the pomp of Egypt, Persia, Greece and Rome.

How will our present "puffing" end? Isn't it obvious that continued inflation can bring disaster? Only by a realistic policy of living within our means--not trying to be bigger than we are--can America avoid the catastrophe of Aesop's foolish frog.

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The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

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The Wire Outlook

No act of the Executive Branch of the Government within our memory has aroused so universal consternation and condemnation as that of the steel industry seizure. The attorney general even went so far as to plead that the courts had no authority to review an executive decision—indicative of the above-the-law attitude of the Administration.

Fortunately, straight-thinking Judge Pine disposed of this argument and stated that unchallenged previous illegal acts established no precendent to sanctify this seizure. Before this editorial appears the Supreme court, "packed" by the previous incumbent, will have ruled on the case. Let us fervently hope that its taint of political bias may be erased by the decision here.

Nevertheless, a number of bills are now before the Congress to clarify, define and limit a President's future actions. A constitutional amendment to the same end is also being drafted. Out of the mess may come some good, although the damage is done insofar as the sixth round of wage increases, the loss of precious steel, the wave of strikes and the start of another cycle of inflation are concerned.

Were wastrel Truman in earnest about his interest in the real welfare of labor—and who isn't—he would curtail government expenditures to bare necessities and cut taxes. Even now, fearing deflation, Washington is oiling its anti-depression wheels by easing curbs on installment buying, softening controls on billing, decontrolling materials at a stepped-up pace, and by starting new Federal borrowing.

It is going to be a tough job as prices go higher—as they'll have to soon—because lack of consumer spending already is being felt now by many manufacturers. While increases will not appear immediately, prices must reflect the added costs if manufacturers are to stay in business. This year, between higher costs and taxes, profits are likely to be squeezed to dangerously low levels. The CIO, while insisting on more worker-wages and "fringe benefits," is also urging tighter controls on prices. The attitude would be ironically humorous, were it not so tragic and unbalanced.

Domestic and Chilean copper mine strikes have made the immediate copper supply outlook bleak and the Government is being urged to draw upon its stockpiles to avoid shutdowns. The long range prospect is good, however, as 1956 production capacity will be 22% over current levels and 45% of the first half of 1950.

The demand for lead has been dull, resulting in two price cuts of one cent each, with small immediate effect. The cuts were made to spur buying. Lead and zinc decontrols are imminent. One major producer estimates a zinc surplus of 129,000 tons this year, based on a consumption of 889,000

Rod and wire users are buying sparingly to keep inventories low and a general easing in the supply of wire products is noted. Spring forming is somewhat off and selling becoming highly competitive. Nails are now in plentiful supply. Screw backlogs are down and cold headed products in easier demand. Somewhat improved demand for spring and upholstery wire for automotive manufacture has resulted from anticipated larger production schedules. Galvanized wire demand has improved and rope, guard rail cable and mesh have responded to the seasonal demand. Calls for alloy and baron wires have been moderate. Generally speaking, the wire situation is good, except for copper, where supply is falling far behind demand. As steel rod stocks were good at the beginning of the strike, no immediate effect will be felt, but it remains to be seen as to how deeply the loss of over two million tons of steel will cut.

Business leaders are evidencing a restrained optimism. There are good spots and bad. Those lines that are picked to remain in a favored position for the balance of the year are building materials, construction, machinery, machine tools, steel and, of course, defense work. Both industrial and residential construction are expected to be at high levels, with private housing running 20% ahead of 1951, leading all other types of building projects.

There will be no boom this year, in spite of renewed efforts to "prime the pump". One thing can be anticipated with certainty—we are entering upon an era when there will be a real need to sell what we make.

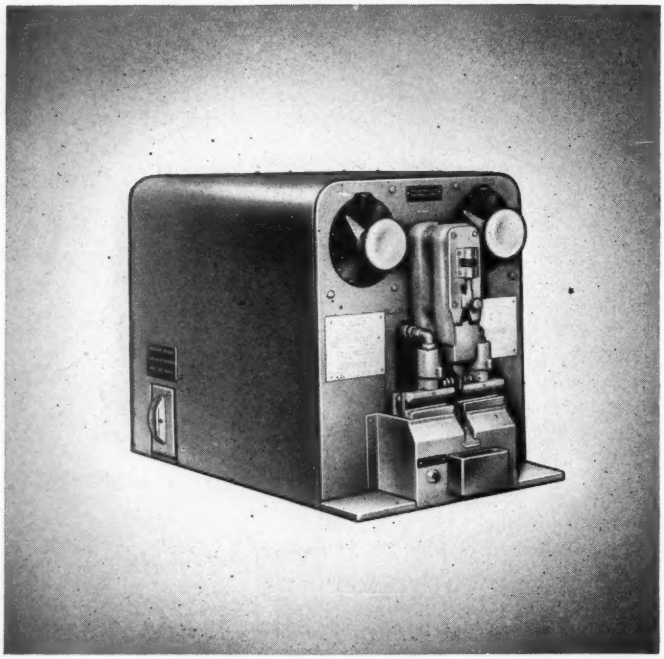
—from the Editor's Desk

CABLE CUTTER TYPE A-I

FOR CUTTING STRANDED STEEL CABLE UP TO 1/4" IN DIAMETER

OUTSTANDING FEATURES

- Uses a combination of an air-operated cutter and an assistance heating unit.
- Sheared ends of cables are slightly "necked down" making insertion into cable terminals easier.
- Heating at the cutter reduces fraying or unraveling to a minimum. Controllable temperature will vary the degree of fusion.
- Ends are square and uniform after shearing so that close length tolerances may be maintained.
- Operation is completely automatic after cable has been placed in position and starter button is pressed.
- Complete cycle of operation requires only 3 seconds.



Cable Cutter, Type A-I

DESCRIPTION

Cutter blade is activated by a JLE pneumatic cylinder which forces the blade through and removes a slug from the cable. Pneumatically-operated clamps hold and stretch the cable at the cutting point. The clamps also serve as electrical contacts for passing low-voltage, high-current through the cable. Unit operates on 110-volt, 60-cycles A.C.

Ask For CAT. SEC. 2IJ

See Page 601 for a complete listing of JLE Products for the Insulated and Bare Wire Industry

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WIRE AND WIRE PRODUCTS

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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 27 JUNE, 1952 No. 6

ELECTROTINNING COPPER WIRE: A NEW PROCESS PART II—THE MACHINE

by C. O. Bruestle, Director of Engineering
Syncro Machine Company
Perth Amboy, N. J.

This paper presents a detailed account of the physical elements of a process for the continuous deposition of tin upon a moving copper strand. Part I of this discussion, dealing specifically with the chemistry involved, was published in the preceding issue of this journal.

Emphasis has consistently been placed on the need for an electrotinning machine of high efficiency, and acceptable both in overall size and cost. Such a unit is shown by outline drawing, Fig. I, which features a front elevation and plan view of the Syncro 8-line coarse-wire machine. These views clearly illustrate a compact arrangement of the various components, which holds floor space to a minimum.

* * *

Essentially, the electrotinning unit consists of a structural frame supporting the necessary cleaning and plating tanks, rinse stations, contact unit, capstan section and miscellaneous wire guide members. Placed beneath the supporting frame, and floor-mounted, are combination supply and take-up reel units as well

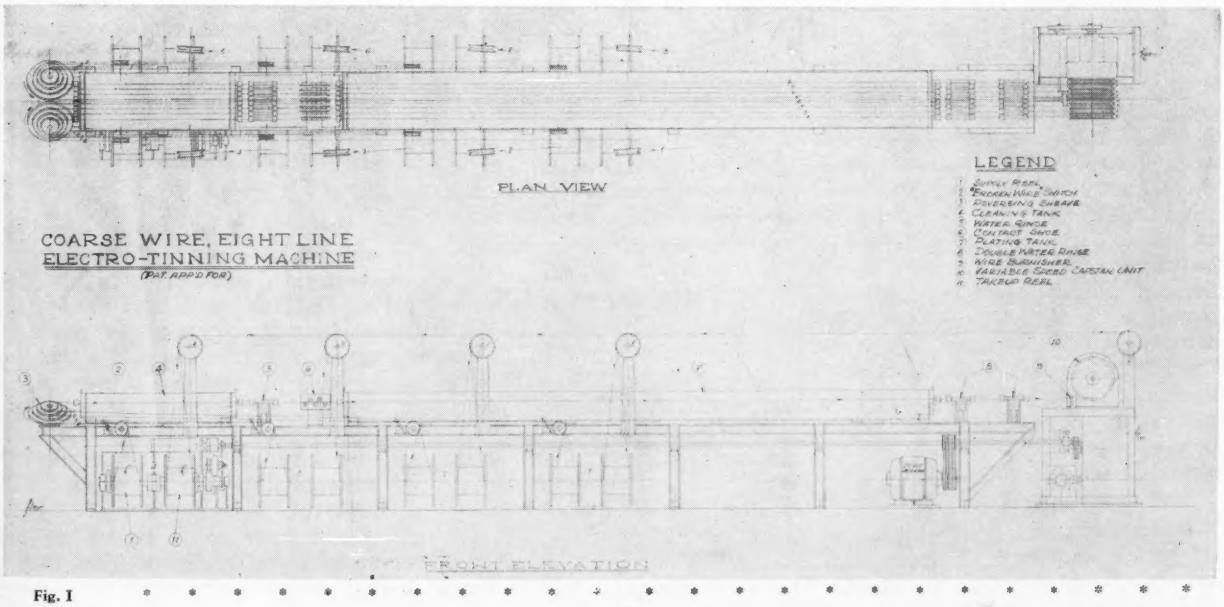

Fig. I

as the main drive motor.

★ ★ ★

The Syncro Electrotinning Machine is the result of fundamental research and development, based on meeting the following key requirements:—

1) **Reasonable speed of operation.**
2) **Accessibility, operator convenience.**
3) **Dependable strand control.**
4) **Maximum range of speed adjustment.**
5) **Simple, efficient current application.**
6) **Effective drag-out control.**
7) **Minimum floor space.**

★ ★ ★

With reference to the chemistry of this process as discussed in the previous issue of this publication, it should be noted that the potassium stannate bath with its high speed of deposition will permit plating at a rate not obtained by present hot-dip methods. While this report has mentioned operating speeds of 600 FPM for sizes #14 to #18 B&S gauge, such limitation originates from the package size from which wire is unwound and, to a measure, from the effective length of the selected plating tank.

★ ★ ★

In a desire to increase overall efficiency of the wire drawing process, Industry has adopted large package sizes, and consequently multiplied the complications originating therefrom during unwinding. Definite operating limits are generally encountered with any process demanding respooling of a relatively weak strand from heavy reels. Starting and stopping, particularly, impose considerable strains and may easily cause elongation and breakage. The tin plating process is subject to such limitations, which are further aggravated by the requirement of processing annealed wire. A well known shortcoming in annealing large packages on reels is the inability of the strand to unwind freely, and to a degree, this is traceable to contraction of the wire convolutions during quenching. Smooth unspooling, therefore, demands a controlled drive to overcome the above hazards. It follows that a "high speed plating-bath" does not entirely determine ultimate operating conditions, but is dependent upon the suitability of the strand-handling equipment.

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It was found necessary to design a special combination supply and take-up unit to solve all of the problems encountered during the unwinding and subsequent spooling cycle. A simple yet effective solution was obtained with the introduction of a self-adjusting interdrive to transfer the peripheral speed of the take-up reel to the reel to be unwound. The supply reel is, therefore, under the control of the take-up reel at all times, and allows the strand to be moved without undue tension while passing through the plating machine. Actual spooling tension is selective and adjustable by virtue of a magnetic coupling that forms part of the take-up reel drive.

★ ★ ★

Deserving of special consideration is the application of plating current, conventionally introduced through multiple contact members positioned at strategic points within the plating tank. The danger of injury to the soft, easily damaged plate which has already been applied, is apparent. Considerations, verified by tests, favored a stationary contact element comprising multiple rollers not unlike the arrangement of a conventional roll straightener. The individual contact rollers are adjustable so as to follow the size of the conductor in process, thereby permitting setting for desirable contact pressure. By positioning the contact element in front of the plating tank, it is possible to feed the plating current to the strand while the latter is clean and bare; this is the most advantageous location and condition.

★ ★ ★

To clear up possible misunderstanding, it must be mentioned that the contact rollers forming part of the contact unit do not revolve. They consist of round members, adjustably supported, and connect to the current supply by means of fixed terminals.

★ ★ ★

It has been mentioned in Part I that there are serious objections to the guiding of an annealed copper conductor through a path that is interrupted by repeated bending due to deflector sheaves. Unnecessary mechanism is introduced and, in turn, undue loading applied to a relatively weak strand moving at high speed. Without simplifying drag-out control, such an arrangement materially cold-works the strand with subsequent physical change of the metal. The Syncro Electro-tinning Machine has all wires positioned in a straight line while passing through the plating cycle, and utilizes deflectors only as dictated by the physical arrangement of the strand-handling equipment, thereby keeping deflection to a minimum.

★ ★ ★

Ideal conditions are created for effective sealing at both entry and exit points of the cleaning and plating tanks. Always somewhat of a maintenance problem, the number of seals has been reduced to four per line in view of the employment of only two tanks for the process. The seal construction features a sliding arrangement and incorporates simple compression members that may be adjusted to prevent all leakage, yet permit operation with minimum seal pressure.

★ ★ ★

Infinite speed adjustment of the plating process to suit the capacity of the unit is a prerequisite. For reasons of mechanical simplicity and its attendant savings, a multiple groove group capstan was selected. It is driven by a mechanical variable speed transmission, thus fixing the plating speed of all lines by the selected capstan setting. Individual, chromium plated grooved capstan rings are, of course, insulated from supporting members and each other in compliance with the method of operation. Stoppage of any line, independent of capstan rotation, does not produce marking of the plated strand resting on the capstan face, due to cancellation of snubbing originating from the respective take-up reel.

★ ★ ★

Valuable floor space has been saved and overall machine length greatly reduced by placing the supply and take-up units beneath the machine framework. Further, utilization of both sides of the machine for this purpose has conserved additional floor space. With supply and take-up reels arranged in pairs for convenient observation, the operator's task has been simplified. It is worthy of mention that the total floor space occupied by this new electrotinning machine, including all elements, does not exceed

45 ft. in length by 6 ft. in width.

★ ★ ★

Considered from the point of view of its structural arrangement and the attention given to desirable features, the Syncro Electrotinning Machine meets all demands previously enumerated.

★ ★ ★

Fig. II depicts a laboratory unit accommodating only two wire lines; in other respects it has the physical dimensions of an 8-line unit. It has been in operation for some time and has served to furnish most of the operating information contained in this report.

★ ★ ★

A more detailed explanation of the structural design features of the elements involved will help to convey a better understanding of their functions as they apply to the plating process.

★ ★ ★

Non-corrosive plating baths immediately allow simplified tank design; hence the selection of plain welded units placed in tandem and supported on a common structural frame. Rubber lining of inner tank walls as well as means to agitate the electrolyte, essential in an acid system, can be dispensed with. A short cleaning tank of 5 ft. length carries a steel anode rack positioned below the wire lines, providing cathodic cleaning which is the most efficient process for copper. Plating takes place in a tank of 20 ft. length equipped with full length chromium plated anode suspension bars. Common features applicable to both cleaning and plating tanks include: sliding type seals at tank ends, built-in overflow troughs to catch spillage of solution occasioned by possible overfilling or foaming, heating elements for the maintenance of specified operating temperature, suitable temperature regulating equipment, hinged covers to prevent undue escape of steam, and sloped tank bottoms to facilitate easy clean-out and drainage.

★ ★ ★

Space is provided between tanks for a water rinse followed by a contact unit to apply plating current. Discouraging results with conventional still-tank rinses forced the development of more efficient rinsing means, and culminated in adoption of the present condenser type rinse tube of approximately 10″ length. Using a suitably adapted basic principle, a high velocity stream of confined rinse water is directed against the moving strand; this expedient has been found to be entirely effective at all operating speeds. Recirculation of the rinse medium should be considered with multiple lines in continuous operation. A double rinse follows the actual plating and should be arranged for drag-out recovery as applied to the first station, permitting the second one to be led to waste or, as suggested to be recirculated.

★ ★ ★

Attached to the machine's structural frame and positioned beneath the tank, is a common line shaft providing rotation for the group capstan as well as for the individual take-up units. A simple squirrel cage type A.C. motor with line starter and multiple "V" belt drive comprises the sole prime mover of the system. Starting of the motor will cause immediate rotation of the group capstan without correspond-

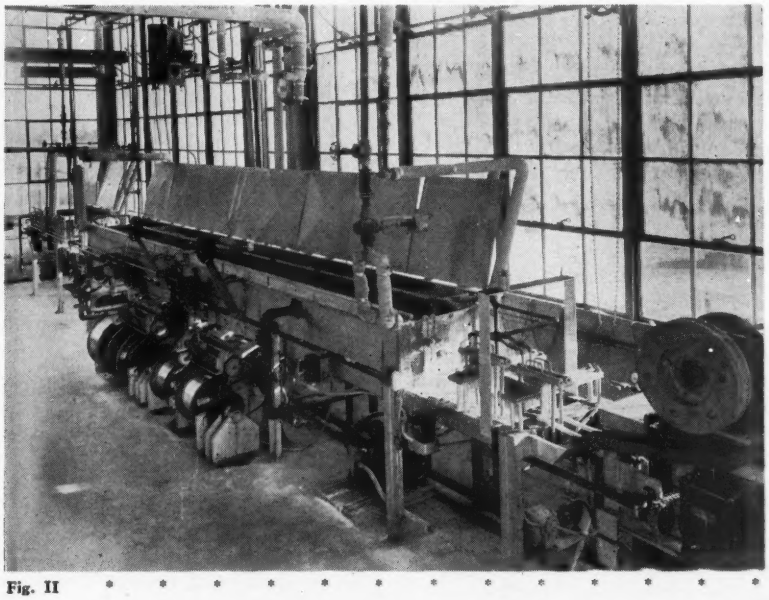


Fig. II

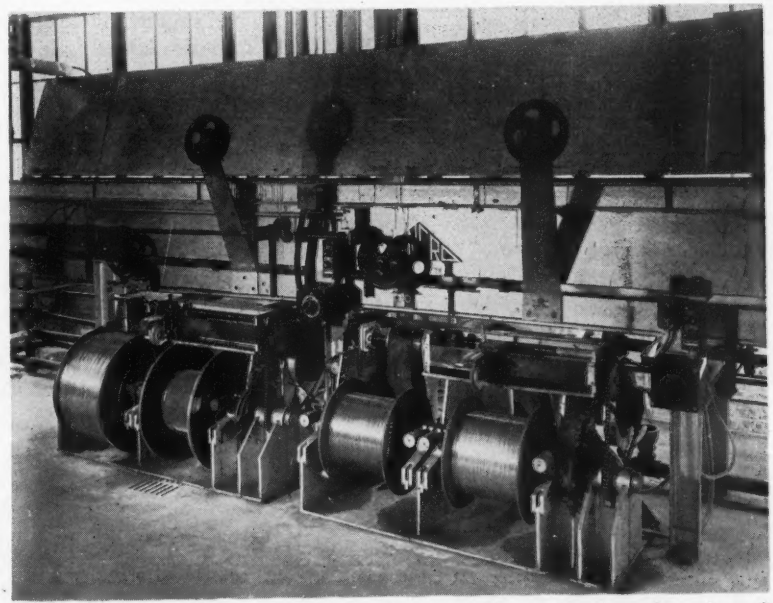


Fig. III

ing wire flow.

★ ★ ★

The group capstan controls the operating speed of all lines within the range of an infinitely variable speed device forming part of its drive. One complete wrap around the capstan face is sufficient for all wire sizes and provides adequate traction. A direct reading tachometer, driven by the capstan shaft, affords accurate speed setting and observation of processing speed.

★ ★ ★

A major portion of the design effort was expended in the development of a combination supply and take-up unit (see Fig. III). Reels of 22″ flange diameter by 11″ traverse (maximum) are supported in a common housing, representing a self-contained assembly of all required elements such as drive, distributor, reel arbor supports, novel interdrive and brake. The take-up reel incorporates an eddy-current type magnetic coupling offering all the advantages of smoothness and tension selection typical of such devices. The inherent ability of a magnetic coupling to absorb considerable speed differentials allows wide variations in wire speeds and permits the use of different reel sizes.

★ ★ ★

Change gears normally considered for such a process are completely eliminated, yet line speed variations and reel differentials are satisfactorily compensated for by the magnetic coupling. Any desired spooling tension can be established by manipulation of a rheostat connected in the coupling circuit.

★ ★ ★

Each take-up unit incorporates a separate, adjustable-stroke, screw type distributor interconnected with its reel arbor drive for constant pitch lay throughout the filling of the reel. By the introduction of an interdrive, automatic synchronization of the peripheral speeds of both supply and take-up reels is established and held for the entire transfer cycle. Two endless belts, each enveloping a common rotatably fixed shaft and floating mating pulleys, are urged against the periphery of the respective reels and thereby transfer existing winding speed from the take-up reel to the reel to be unwound. Two pneumatic pistons with variable air pressure regulators flexibly urge the belts into intimate contact with the wire package, and allow an adjustment of contact pressure proportionate to strand diameter and package weight. It is possible to unwind from a 22″ reel and respool the strand on a 16″ diameter reel without mechanical adjustment, for such change in reel R.P.M. is well within the scope of the interdrive.

★ ★ ★

It was observed during various production runs that it is advantageous to utilize the interdrive when processing #16 B&S gauge and finer; heavier sizes do not require its help. The interdrive is manually positioned for contact or retracted by manipulation of a control valve. Reel arbors are supported in ballbearings as are all rotating members of the machine. Loading as well as unloading of reels is a relatively simple task. After insertion of loose reel arbor, reel is rolled from the floor into operating position; a ramp, however, is required for reels of a diameter less than 22″. The supply reel arbor is equipped with a conventional drag-friction device for better tension control of heavy wire sizes.

★ ★ ★

As has been explained in Part I of this discussion, proper anode filming is essential. An advantage of the Metal & Thermit high-speed tin-alloy anode is its ability to film without the application of overpotential. This important property permits automatic introduction of normal plating current through centrifugal switches interconnected with the spool drive. Energization of the magnetic drive clutch and subsequent reel motion energizes the respective plating circuit, likewise interrupting it at the final motion of the reel during stopping. This automatic function prevents interruptions in the plating on the strand and eliminates overplating while it is at rest. Scrap losses normally emanating from a stop and occasioned by spool changes are thus completely avoided.

★ ★ ★

It is not the purpose of this paper to discuss the most suitable electrical circuit for efficient electroplating; however, it is in order to mention that depending upon conditions, either separate rectifiers for each line or a common motor generator set with suitable control equipment, will form part of a complete electroplating installation. Such equipment is commercially available and must be obtained separately.

★ ★ ★

As further explanation in describing this process, wire movement will be traced throughout its travel. Starting at the supply reel, the wire travels over a deflector sheave positioned immediately above, then through a guide tube along the front of the machine towards the entry side of the cleaning tank. Wire is there reversed 180° to be positioned for straight line passage through the process, first entering the electrolytic cleaning bath. Leaving the cleaning bath, wire passes through the rinse tube, the contact unit for applying plating current, and into the plating tank. On leaving the plating tank the wire progresses through a double high-velocity rinse to the group capstan, thence over two guide sheaves leading to the take-up reel. All wire guide sheaves are ball bearing mounted, non-metallic, and of large diameter to prevent possible marking of the strand or its coating.

★ ★ ★

Initial stringing of a line requires its tank seal members be retracted and raised above the normal plating position, thus allowing safe threading above the hot plating bath while other lines are in motion. Wires are preferably butt-welded or brazed during reel changes. The cleaned joint will pass freely through all seal members in their normal plating position. With but slight change to the compression setting of the wipes to assure proper sealing, all wire sizes within the range of the machine are accommodated. It may not be desirable to subject a strand to prolonged contact with the cleaning solution, as would be the case during extended shutdowns, and it can be withdrawn by the simple expedient of raising its tank seals without disturbing the compression setting.

★ ★ ★

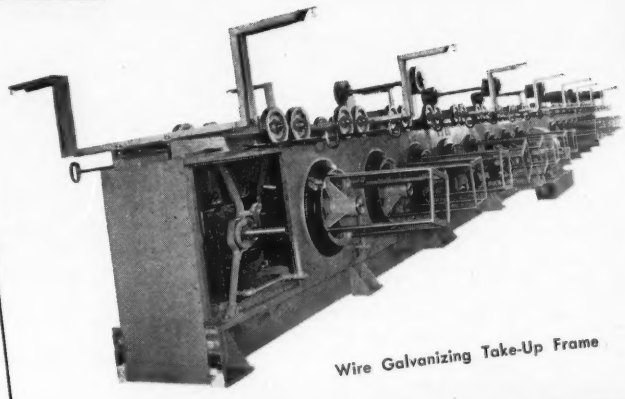
With all conditions set for plating and the seals lowered to operating level, the machine motor is

(*Please turn to page* 632)

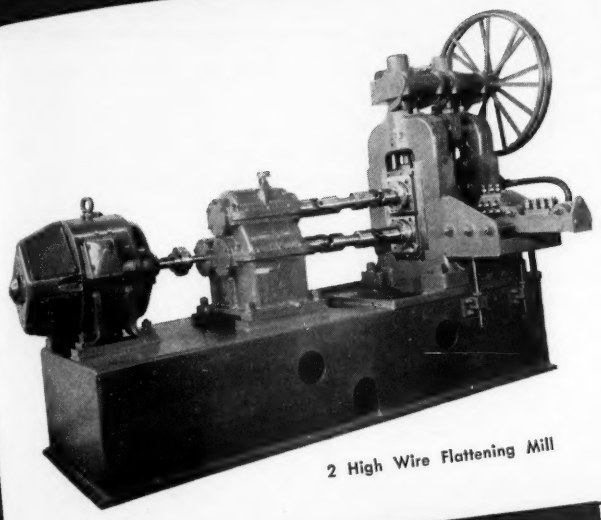
Wean

Equipment Corporation

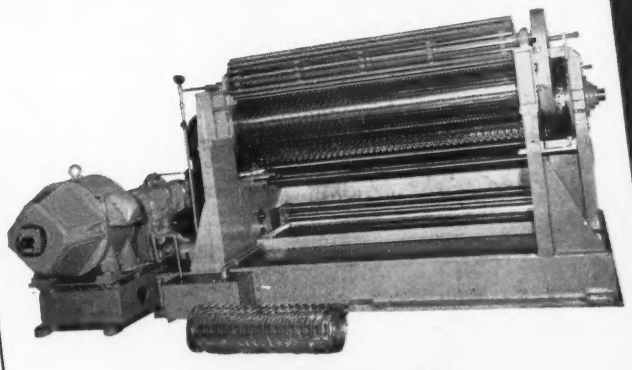
CLEVELAND, OHIO



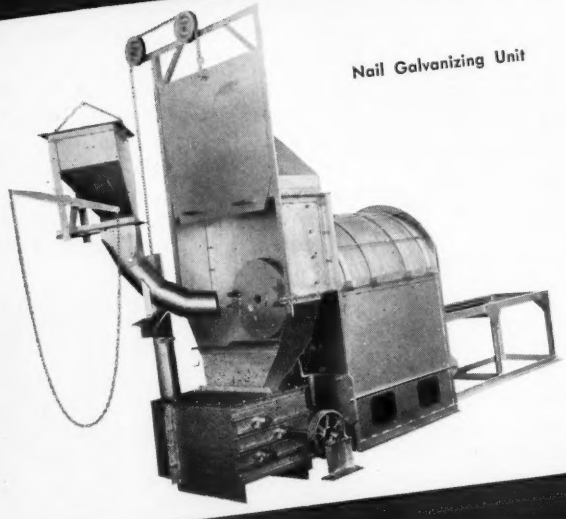
Wire Galvanizing Take-Up Frame



2 High Wire Flattening Mill



Hexagon Netting Machine



Nail Galvanizing Unit

IN the past few years tremendous progress has been experienced in the field of wire machinery. Production speeds have been tripled and quadrupled. Product quality has been greatly improved. Machines have been made easier to operate and maintain.

THE Wean Equipment Corporation has been a large contributor to this advancement. Wean wire mill specialists have designed, built, and installed wire mill equipment for the leading wire producers the world over. If you make wire you should look to Wean for the best in machinery, service, and facilities.

X-Ray Helps Produce Better Wire by New Methods Which Analyze Crystal Structure of Base Metals

by John Buhler
Research & Control Instruments Division
North American Philips Company, Inc.
New York, New York

One of the newer tools of the metallurgist by which certain metals can be quickly and accurately analyzed is the X-ray diffraction unit. A highly technical process, it has nevertheless certain advantages in non-destructive qualitative and quantitative analysis, that is causing the device to be used more and more in laboratories. The author here describes how analyses by X-ray units are made.

When one mentions X-ray as a production tool, nine out of ten technicians think of radiography. This application has been in use for many years and a typical example of the popularly recognized technique is one where castings are examined for flaws and blowholes.

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World War II brought X-ray diffraction to the forefront as an indispensable non-destructive qualitative and quantitative method for analyzing the atomic structure of crystalline substances. Then, in 1948, still another X-ray technique was developed—the use of the Geiger counter in X-ray fluorescence analysis—providing a means of obtaining additional answers for tough questions concerning basic materials, especially metals and their alloys.

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Conventional X-ray diffraction equipment employs cameras and films for recording the intensity and angular relationship of the X-ray beams picked up from the specimen. As a matter of fact, for certain types of work, camera and film methods are still the best solution for the problem today.

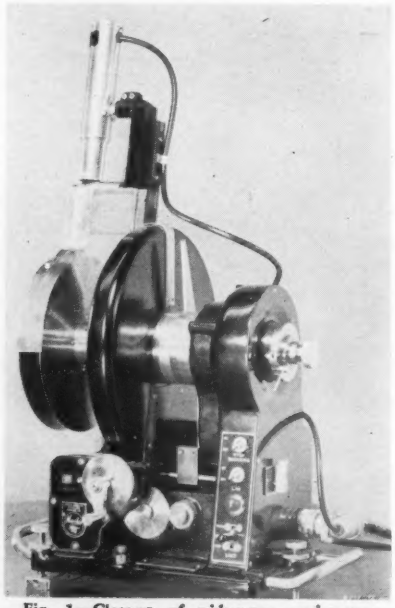

Fig. 1—Close-up of wide-range goniometer, with protractor, Geiger counter, slit assemblies, filter and specimen holders.

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In a large number of cases currently encountered, however, the Geiger-counter spectrometer provides accurate X-ray diffraction data in a much faster and less laborious manner—this makes the instrument extremely useful for production control. The modern X-ray spectrometer replaces cameras, substitutes a Geiger counter and coupled strip-chart recorder for film, to provide a means of reading intensities and determining angles. Thus, results are obtained by nearly automatic methods through interpretation of a strip-chart record.

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To give the reader a clear idea of the latest developments in the field of X-ray analysis instrumentation, it is necessary to explain the basic difference between X-ray diffraction and spectrometry as compared to X-ray fluorescence.

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In diffraction spectrometry, the primary beam of X-rays is passed through a collimator and slit system to the specimen which is mounted on the central axis of a goniometer around whose periphery a Geiger tube moves. Leaving the specimen, the beam passes through another collimator and slit system to the Geiger tube. Mechanical methods are used to maintain the specimen in the proper relationship with respect to the Geiger tube as it moves through its scanning arc. Actually, the specimen moves at half the angular speed of the Geiger tube. Thus, a line perpendicular to the specimen face always bisects the angle between the primary X-ray beam and the beam being picked up by the Geiger tube.

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In fluorescence analysis, the primary X-ray beam is directed upon a stationary specimen having a fixed angular relationship with respect to both the primary beam and the goniometer axis on which a rock salt crystal is mounted. The fluorescent radiation coming from the specimen passes through a collimating system before reaching the rock salt crystal in order to eliminate all but parallel rays from the beam. The rock salt crystal acts as a diffraction grating, resolving and dispersing the various wavelengths in the same manner as an optical grat-

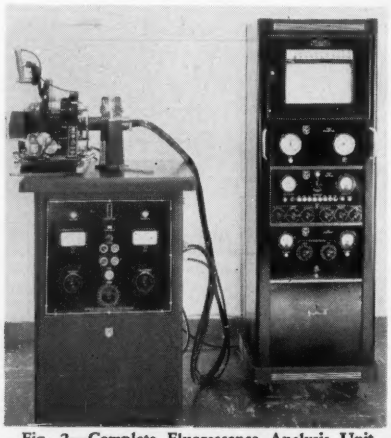

Fig. 2—Complete Fluorescence Analysis Unit with basic X-ray unit, horizontal X-ray tube, goniometer, and electronic circuit panel with strip-chart recorder.

ing diffracts visible and ultra violet radiation in the optical spectograph. Long wavelengths of X-radiation are dispersed to higher angles, while the shorter wavelengths are dispersed to lower angles. The crystal disperses the various wavelengths sufficiently that each may be individually detected by the Geiger tube, and the intensity of the radiation measured.

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From the foregoing, it should be clear that diffraction and spectrometry techniques direct an X-ray beam into a specimen from which secondary beams of the same radiation are reflected. The secondary beams come from the atomic planes of the specimen, bear a specific relation to them and therefore provide positive means of identification, regardless of whether film (diffraction) or a strip-chart (spectrometer) are used for recording the results.

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On the other hand, fluorescence analysis bombards a specimen with high-energy level X-rays, then directs the secondary characteristic radiations of different wavelengths upon a rock salt crystal which acts as a diffraction grating to permit differentiation between the various wavelengths representing the elements present.

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To illustrate the function of X-ray diffraction and spectrometric equipment, suppose we consider a mixture of three lead compounds PbO, PB_3O_4, and PbO_2. Diffraction or spectrometric techniques will identify the three compounds and subsequent changes in the basic structure of the mixture, whether it involves a change in the form of the element, its phase or its molecular weight.

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Using the same mixture of lead compounds, fluorescence analysis on the other hand, gives a speedy answer concerning the total amount of lead present, regardless of the state of combination—thus, with this tool we can determine the total amount of lead (free or combined, or both) that exists in the three compounds which make up the mixture.

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This preliminary explanation of the difference between X-ray diffraction and fluorescence analysis should clarify any obscure points on functioning and use of the equipment. Since it is assumed that the reader has at least a fair knowledge of diffraction methods but is totally unfamiliar with fluorescence analysis techniques, the remainder of this article will be devoted to the latter subject.

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Fluorescence analysis specimens can take any one of a number of forms. If one is dealing with a liquid or solution, the material is placed in an open-faced level holder; in vapor form, the specimen goes into the same holder under a thin transparent membrane cover. Powdered material is placed in the open-faced holder and the surface is pressed flat. Metal specimens are cut to about one inch square by 1/16 to 1/4 in. thick, to provide optimum thickness, although foils or evaporated films can be placed in the specimen holder. Irregularly shaped specimens, in which cutting or deforming is impractical, can be placed in the specimen holder in such a position that irradiation of a face can be accomplished.

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Each specimen becomes a secondary standard, and may be used to

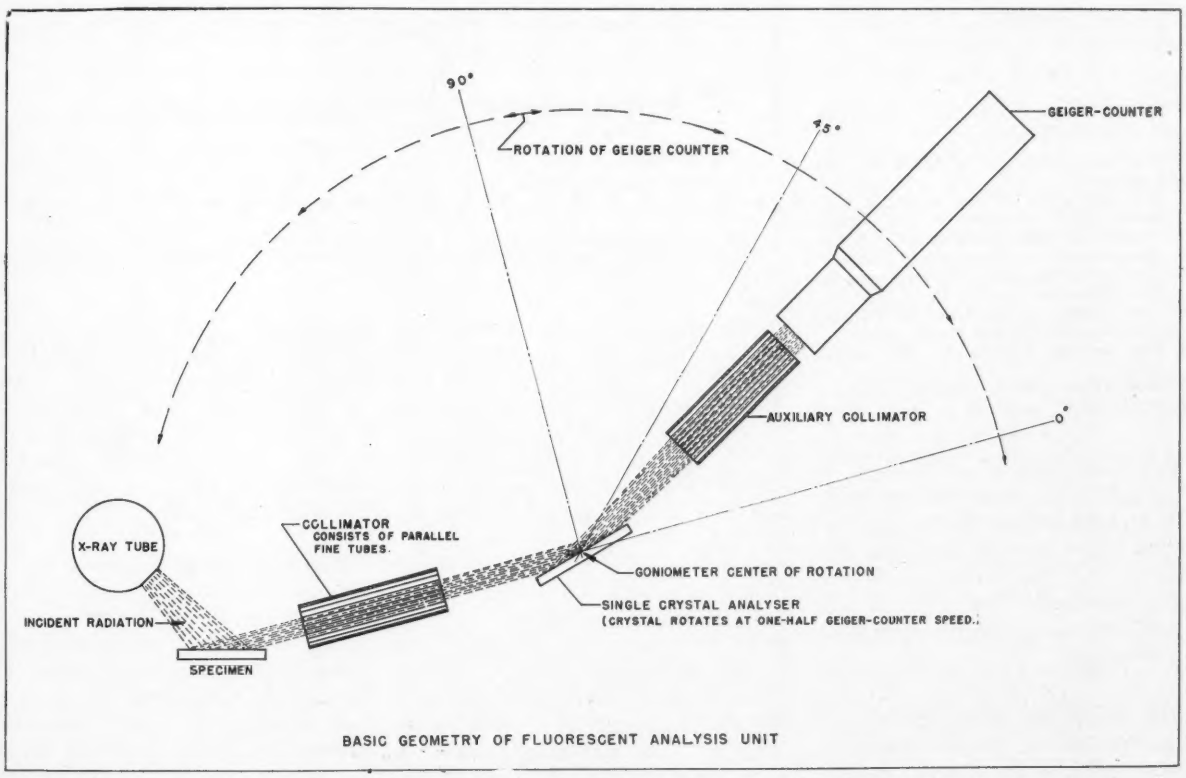

Fig. 3—Schematic diagram showing principle of operation for Fluorescent Analysis Unit. * * * * * * * * * *

extend the supply of standards, because there is no change in the specimen caused by the analysis. Since the radiation covers a relatively large area of the specimen (approximately ⅝" square as viewed by the collimator) the effect of segregations and non-homogeniety is not as important as it would be in spectrographic analysis where a relatively small area is contacted by the arc or spark. Furthermore, determinations can be made up to 100% of a given element.

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Fig. 2 shows the positions and line intensities as recorded on a strip-chart for chrome-nickel plating on a silver copper-base. The vertical scale is graduated in counts per second and the horizontal scale in degrees. From this chart alone, we see that silver, copper, nickel and chrome are present. Furthermore, we see approximately the proportions of each element in the specimen. However, to determine accurately the exact amounts of each of the constituents it is necessary to have charts on a number of specimens on which complete analysis data are available. These serve for comparison and make it possible to plot calibration curves or charts from which future specimens may be evaluated.

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The variables involved in fluorescence analysis include:

1. **The percentage of element in the specimen.**
2. **The absorption effects of other elements and particularly the major element in the specimen.**
3. **Air absorption effects.**
4. **The reflecting plane spacing (d) of the diffraction crystal.**
5. **The voltage (kvp) and the current (ma) applied to the X-ray tube.**
6. **The voltage applied to the Geiger tube.**
7. **The Geiger counter characteristics.**
8. **Statistics of counting.**

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The percentage of an element in a sample determines the intensity of the characteristic fluorescent radiation of the element involved. The intensity of the characteristic radiation is—neglecting other factors—proportional to the percentage of the element.

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The absorption of the fluorescent radiation from a given element is proportional to the atomic density of all other elements constituting the specimen. This is particularly true of the major element. If the major element is low in density (low atomic number) its absorption of the secondary radiation of the element involved will be relatively low, and will not greatly reduce its intensity. However, if the major element is high in density (high atomic number) the absorption of the secondary radiation from a given element in the specimen will be relatively high. Lower density elements also absorb the secondary radiations strongly in certain wavelengths. This absorption effect is very marked in the region of the wavelength immediately shorter than the K absorption edge (Ke). Thus, in a theoretical specimen containing arsenic and bromine, the bromine (K) radiation with a diffraction angle of 10.64° would be absorbed strongly by the arsenic Ke which occurs at 10.68°.

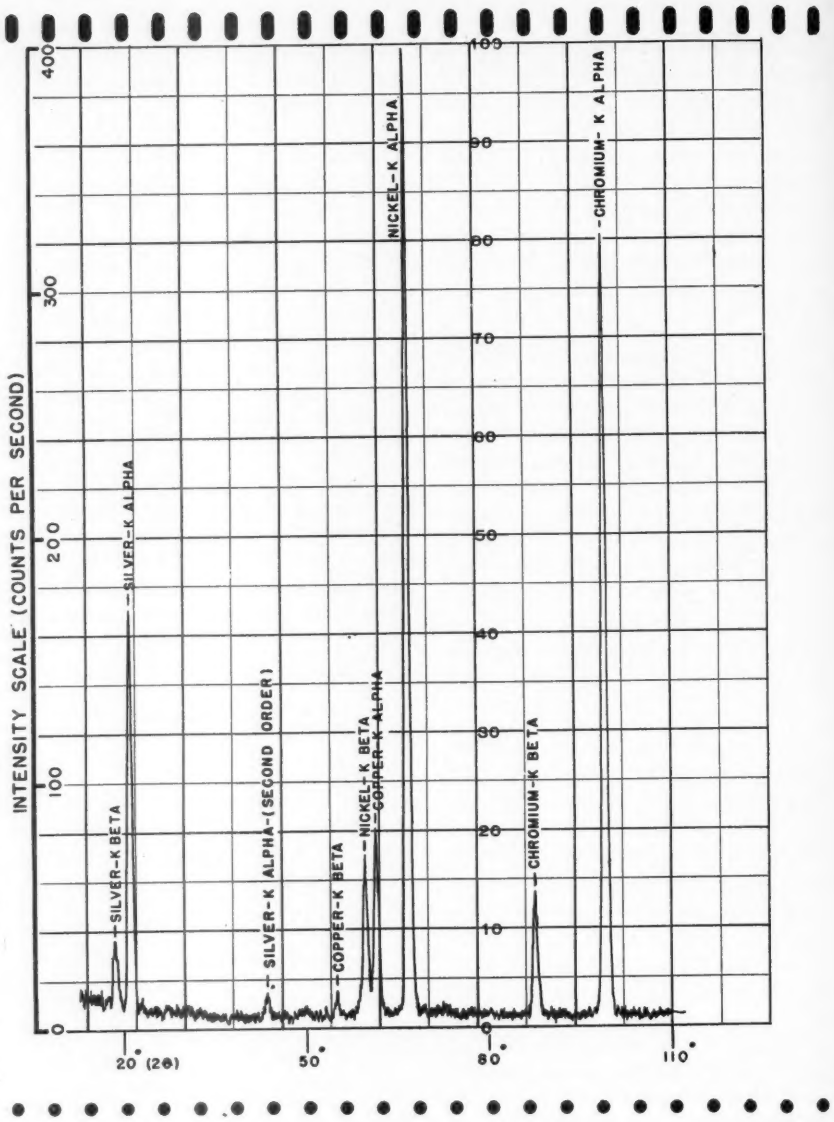

Fig. 4—Typical fluorescence analysis chart of a chrome-nickel plating on a silver-copper base showing vertical scale graduated for intensity (counts per second) and horizontal scale graduated for diffraction angle (degrees).

The intensity of any radiation decreases as a power function of the distance traveled. Thus, other things being equal, it is of advantage to have the distance between the X-ray tube target and the specimen, and between the specimen and the diffracting crystal and the Geiger counter, as short as possible. How-

ever, the resolution increases as the distance or length of collimation increases, so it is necessary to compromise between maximum resolution and intensity of radiation.

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Air absorption increases as the distance increases, but is not appreciable except for the longer wavelengths. However, air absorption is very high for wavelengths above 3.3 Angstroms. Thus, for fluorescence analysis of elements whose radiation is above this limit, it is necessary to provide an evacuated system or one filled with a low density gas (such as hydrogen or helium). The absorption of wavelengths just below the 3.3 Angstrom limit may also be decreased by decreasing the length of the collimator. This also decreases the resolution; however, considerable gain may result, since the resolution of the lower wavelength radiation is relatively high because of the high dispersion angle.

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The intensity of the diffracted radiation will be dependent also upon the reflecting power of the crystal plane involved. Some planes reflect more strongly than others, so it is advantageous to select a crystal such as rock salt which has the proper crystallographic plane spacing as well as a high reflecting power. The crystal should therefore be carefully selected and its reflecting surfaces should be carefully prepared. Intensity of the radiation reflected is dependent upon the methods of cleaving, grinding, and polishing the surface.

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Intensity of the incident radiation is dependent upon the current applied to the X-ray tube. Increasing the current increases the intensity, the practical limit being the wattage limit of the tube. The potential applied to the tube determines the minimum wavelength produced and therefor the shortest wavelength of secondary radiation which can be generated, and hence the atomic number of the heaviest element which can be analyzed.

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However, there is a practical limit to the effective voltage which can be applied in producing a given wavelength of fluorescent radiation. Higher potential will produce a greater amount of radiation of shorter wavelengths, which in turn will for the same current setting, produce a greater intensity of secondary radiation. A saturation point is reached, however, above which increasing potential has no effect. As the voltage increases the penetration of the incident radiation increases because of the shorter wavelengths, but the longer wavelength fluorescent radiation emitted is completely absorbed by a definite thickness of the overlying material of the sample. Consequently there is a definite limit to the intensity produced by increasing the potential.

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The voltage applied to the Geiger counter tube greatly influences the counting rate. The tube should be operated at a voltage well up on the Geiger plateau, which is approximately flat for a range of several hundred volts. Higher voltages cause the Geiger counter to become unstable and will increase the counting rates very rapidly, but will not permit usable reproducible results. Lower voltages cause the tube to operate below the Geiger plateau, greatly affecting pulse size and usually producing a decrease in counting rates. The Geiger tube utilized in the fluorescence analysis unit operates at approximately 1400 volts. The tube is volume sensitive, that is, radiation entering any part of the major volume of the tube will produce counts. This permits utilization of the entire area of the collimated beam.

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The entrance of an X-ray quantum into the gas filling of the Geiger counter tube causes ionization of the gas and permits a pulse of current to pass. Since quanta enter the tube at irregular intervals, the pulses of current are also random. In counting random phenomena, a sufficient number of pulses must be counted to reduce the probable error to a suitable degree. It has been determined that by taking approximately 5000 counts above background, in any given interval, this error can be reduced to 1 percent.

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Since fluorescence analysis equipment and techniques were first introduced by Philips in 1948, metallurgists have found this tool to be a powerful new means for production control. It is extremely fast in that only approximately 3 to 5 minutes per element will be required for the analysis after the sample is prepared. Steps include: 1. Inserting the sample. 2. Setting the crystal and Geiger counter at the proper angles to detect the K (or L) radiation from the element desired. 3. Measuring the intensity with the Geiger counter for the required time. and 4. Comparing the number of counts with that of a standard sample of somewhat similar composition. Operation is simple enough that a highly trained operator is not required, the average laboratory technician being capable of operating the equipment, once the analytical method has been established.

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The accuracy of quantitative analysis to be expected varies somewhat with the nature of the specimen components, but optimum accuracy, in the order of ½ of 1% of the element present, may be obtained under most favorable circumstances. This accuracy is not to be expected in direct readings on elements of a low order of detectability, or from unusually small specimens, or at limiting percentage ranges. Under optimum conditions of absorption and sensitivity, detection extends to the *few-parts-per-million* range.

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Fluorescence analysis in conjunction with X-ray diffraction or X-ray spectrometry is already performing important tasks in the production of basic metals and their alloys. It can be put to good use in the wire plants also, not only to check on quality of materials purchased but also to study changes in characteristics which are the direct result of drawing and associated operations.

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COATING METAL USED IN HOT-DIP GALVANIZING

by Wallace G. Imhoff, President
Wallace G. Imhoff Company
North Highlands, California
Part III

In his third article in the series on galvanizing, Mr. Imhoff covers three classes of metals that are added to baths to achieve certain objectives in coatings. In his fourth and final article, to appear in an early issue, he will discuss the coating qualities resulting from different galvanizing bath compositions.

Metal and Alloy Additions to the Galvanizing Bath

This phase of coating metal used in hot-drip galvanizing can logically be divided into three different parts —first the very common metals that are added to galvanizing baths for one purpose or another. In this class are aluminum, tin, antimony, copper, and cadmium, which has been mentioned in a previous discussion, if no cadmium is present in the slab zinc. Second, there are various metals such as nickel, chromium, magnesium, bismuth, arsenic, tungsten, and various alloys of silicon, manganese, and other metals which have been tested for the action of molten zinc at galvanizing bath temperatures upon them to note what happens both to the metals and alloys, also what their action is upon the flux and fluxing conditions, and finally what direct effects that they exert on the galvanizing bath itself. The third phase consists in understanding the effects of alloy additions to the bath consisting of various mixtures of all the metals mentioned above in various mixtures and proportions, containing some metals for one purpose, and other metals for other purposes, and finally making them into alloys in order to get the metals more quickly into the galvanizing bath by using large portions of zinc in the mixtures.

Aluminum Additions to the Galvanizing Bath

Aluminum additions are by far the most important of any metal or alloy that is added to the galvanizing bath for any purpose. Richards took out a patent in 1876 covering the technique of adding aluminum to the galvanizing bath, but then aluminum was a rare metal, that is compared to what is known about aluminum today, and about its uses.

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The actual quantity of aluminum added to the galvanizing bath is definitely affected by a number of components which must be known in order that such additions be made intelligently. For example, aluminum additions are seldom if ever made to sheet and wire galvanizing baths, while in other fields of galvanizing, it is always added. It is not possible at this time to give a detailed discussion on aluminum and the many aspects of the adding various amounts to the bath; only a brief mention of the different fields of galvanizing will illustrate the practical results of adding this metal to a galvanizing bath. In Sheet Galvanizing baths the standard practice is not to use any aluminum at all; in Pipe Galvanizing baths the average content is perhaps around 0.010 to 0.020% with an upper limit of 0.030 percent. In Electrical Conduit Baths little if any aluminum is used; none to 0.005%. For Wrought Iron Pipe Baths the average is 0.010 to 0.020% with an upper limit of 0.030%. In Structural Steel Baths the limit for aluminum alone is 0.010%, but baths have been found that carry more aluminum along with tin or cadmium. In Pole Line Hardware Baths the large structural baths carry 0.010% when aluminum is used alone, but with other metals in the bath the aluminum sometimes is carried higher. The medium work has the same upper limit with aluminum alone of 0.010%. However, with small threaded work the aluminum in the bath must be cut down to 0.005%. This is because the aluminum tends to make the small articles bunch together in the water quench bath. Steel Barrels and Drums have a limit of 0.010% aluminum when alone. The Metal Ware Field of galvanizing is one field where the amount of aluminum in the galvanizing bath varies over a wide range; lower if aluminum is used alone, but sometimes very much higher when used with other metals such as tin, cadmium, or antimony. For the "Block Spangle" (made with aluminum alone) the bath may carry from 0.010 to 0.020% aluminum. For the "Flower Spangle" the aluminum may go as high as 0.050% since both tin and cadmium may also be present. For the "Pearl Spangle" the aluminum may reach an upper limit of 0.100% along with tin, cadmium, and antimony additions to the same bath. In Range Boiler and Tank Galvanizing Baths the limit for aluminum when used alone is 0.010%, but some water heater galvanizers also add small amounts of other metals which permits more aluminum to be used along with these other metal additions. In Malleable Iron Fittings baths if aluminum alone is used, the amount is small, 0.005%. With tin and cadmium the amount may be raised to 0.010%. Miscellaneous and Job Galvanizing Baths may carry up to 0.010% of aluminum alone, but as high as 0.020% aluminum with other metals such as tin and cadmium.

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It is obvious at once that there must be a good reason for only using definite amounts of aluminum under specific conditions. Aluminum forms a thick heavy metallic skin, hence is not used in either sheet or wire galvanizing. There are many other reasons for using it in some baths, and not using it in others. If used at all in Electrical Conduit Baths,

the amount must be extremely small, since in that field the coating is extremely light, and must be very flexible. In other fields it is a distinct advantage giving brightness to the finish, but great care must be taken to avoid an excess of aluminum in the bath because then the blue aluminum oxide comes out with, and in the coating as scruf, oxide, and dirt. When no lead is present in the pot, the combination of high aluminum and high iron in the bath means the worst kind of trouble. Excessive dross is formed; the metal per ton of product may be doubled; operating conditions become very difficult and sluggish, and if something is not done, the combination may be extremely costly. The whole subject of the use of aluminum in galvanizing baths is extremely complicated, and requires much practical galvanizing experience to really fully understand when to use it, and when not to use it, as well as how to accurately control it, and get the results wanted, when it is being used as a metal addition to the bath. Aluminum not only affects the zinc-iron alloy bond thickness, but in large amounts has a distinct effect on fluxing conditions by destroying the flux, forming aluminum chloride, which is volatile, instead of the normal zinc chloride necessary for good fluxing conditions.

Tin Additions to the Galvanizing Bath

Rawdon states, "Tin is sometimes added to the zinc bath to improve the surface appearance, and to ensure uniformity of coating thickness. Amounts as high as 3% have been reported. The usual amount is considerably below 1% however. The surface of such coatings is said to tarnish rather easily. The effect of tin on the zinc-dipping process is, in all probability, to be ascribed to its influence on the melting point of zinc. The addition of even small amounts causes the freezing of the metal to be spread over a considerable range of temperature, solidification not being complete until a temperature of 198 deg. C. (388 deg. F.) has been reached."

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There are many aspects to adding tin to galvanizing baths, all of which should be thoroughly understood. For example, a metal ware galvanizing bath of about 23,000 pounds had three one-hundred pound pigs of Straits Tin added to it at one time. There was also aluminum and cadmium present in the bath, and the resulting combination of metal additions developed a very beautiful iridescent, frosted, fern-like flower spangle on the ware which caused one of the company salesmen to remark, "We do not have to sell our galvanized ware anymore; it is so beautiful it sells itself."

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Tin additions tend to thin out the galvanizing bath, and give a thinner, lighter, coating than with zinc alone. Most sheet galvanizing baths have tin present to give the finish the bright smooth, tin-spangle which takes the form of a five-pointed star. The actual amount varies depending on how much tin is available, how much expense of galvanizing is allowed for the tin, and what kind of a finish the company prefers. In recent years many types and kinds of finishes have been developed for galvanized sheets; each finish is usually desired for some specific purpose.

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It was mentioned under aluminum additions, that this addition tends to thicken up the metal. Tin has the opposite effect on the galvanizing bath, tending to thin it out, so the amount of tin that is added is often judged by the amount of aluminum in the bath. As a typical example, when only a very small amount of aluminum is present in a pipe galvanizing bath, then only up to 0.25 or ¼ of 1 per cent of tin would be added. A pipe bath carrying between .010 and .030% aluminum, might carry up to 1.00 to 1.50% of tin, with no harm. Since corrosion resistance depends upon the weight of coating, and the thickness of coating, even though tin additions give a beautiful bright, smooth finish, it is claimed, and with good grounds, that high additions of tin are harmful, because of the fact that tin thins the metal, gives a thinner coating, and hence due to less metal being deposited, the coating is not as resistant to corrosion as a heavier zinc coating with no tin in it. Since finish is a selling point, sometimes some tin is added, even though it is known that the corrosion qualities are somewhat lessened.

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This same argument holds in other fields of hot dip galvanizing, also, where some corrosion resistance is sacrificed as a compromise to obtain a higher quality finish. In really difficult types of work, such as small threads, nails, screws, and centrifuge work, it has been found to be a distinct advantage to use a bath carrying some cadmium or tin. Both of these metals tend to give the finish a beautiful smooth, bright, metallic lustre, but the most important reason for their use is to keep the work from sticking together, and give a product that has a beautiful, smooth, bright finish. In one case where large amounts of aluminum alone were used for the purpose of giving a bright finish, very large chunks of articles stuck together in the water quench tank. Eliminating the high aluminum in favor of cadmium and tin for the brightener, eliminated the large chunks of articles stuck together, and gave clean, separate articles with a beautiful metallic lustre for a finish.

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It can be generally said that more tin can be added when aluminum and cadmium are also present in the bath. "Tin yellow", or an ugly yellow tin oxide deposit often forms when large amounts of tin are present, and the aluminum and cadmium are down. Usually a small aluminum addition will clear up this yellow stain (tin-yellow).

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When tin is very scarce, or high in price, as in war time, a smooth, bright metallic lustre may be obtained on non-spangled work by using high cadmium zinc. The cadmium is even better than tin when used for this purpose.

Antimony Additions to the Galvanizing Bath

Antimony additions to the galvanizing bath give the coating a beautiful frosted, irridescent "Pearl Spangle". The same beautiful crystals can be seen in the cast slabs of antimony, and the examination of these

slabs show the metal to be extremely hard and brittle. Additions of aluminum have been said to produce "Block" spangles; additions of tin have been said to produce a "Flower" spangle; and a "Five-Pointed-Star" spangle; and additions of antimony and cadmium produce a "Pearl" spangle, and give the coating a dull frosted look.

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The metal antimony melts at 1166 degrees Fahrenheit a much higher temperature than the point at which the metal zinc melts (786 degrees F.). If a piece of the metal antimony is put into a molten zinc bath, it floats on the surface, and merely forms a white oxide coating over the metal; it will not melt or alloy with the molten zinc. Thus when additions of antimony are made to the coating metal for hot dip galvanizing, zinc and antimony are made into a zinc-antimony alloy. The proper method is to melt the antimony up in one pot, and the correct amount of zinc in another container, and then pour the two metals together making the zinc-antimony alloy. Such an alloy readily goes into solution in the galvanizing bath, and while a smaller amount of antimony may be added at one time, still it is under better conditions, and there is only a small waste of the metal antimony in making the alloy. Sometimes a lead-antimony alloy is made up, and this is especially desirable when the galvanizing bath is short of lead. Lead is very beneficial in galvanizing baths, and any excess simply goes to the bottom of the pot as a cushion for the dross to rest on. The zinc-antimony alloy, or lead-antimony alloy, which ever is made, is then poured into cakes and these can be added to the galvanizing bath from time to time as needed. Sometimes the alloy is run into bars for more convenient handling, and so that it will go into solution faster in the molten zinc bath.

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Metallic antimony is never added to the galvanizing bath alone. This is because of waste by oxidation, and the extreme difficulty of getting the metal to go into solution, or alloy with the molten zinc bath. It is generally added to the galvanizing bath in the form of the zinc-antimony, or zinc-lead alloy. Sometimes the antimony is mixed with tin and the alloy bar or cake of tin, antimony, and zinc is added to the bath. In order to definitely control each metal addition as the effect of the metals diminish, each separate metal would have to be alloyed with the zinc and made into bars. This is the most accurate method and should be employed for additions when possible. Only an expert galvanizer, who knows every practical indication of the amount of the metal present can add the metals alone, and even then metal additions like antimony have to be made into an alloy to get the metal into the coating metal at all. As mentioned before the metal antimony is extremely hard and very brittle, besides having a melting point much higher than the metal zinc.

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Antimony additions have a tendency to give the coating a dull frosted appearance, and to promote a large "Fern-Like" crystal, or spangle which has a "Pearly Lustre" when the light strikes it in certain directions. Very great care must be exercised in making antimony additions to the galvanizing bath to see that too much is not added. An excess will produce an ugly "Yellow Smear" all over the finish and completely ruin its sales appeal. If such a defect does occur, this trouble may be overcome (if too large an amount has not been added) by adding a little pure sheet aluminum, aluminum in an alloy bar, or bar aluminum held down under the bath surface in an enclosed metal basket. Slab zinc carrying high cadmium will also tend to make the "yellow smear" disappear, or a very small amount of tin may eliminate it. All of these metals alloy with the antimony in the bath and take up the excess antimony which is causing the formation of the "yellow smear".

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A most interesting case as to the effect of the metal antimony in the coating metal for galvanizing, is on record. The formula for making up the antimony alloy was taken from a metal ware galvanizing shop and an attempt to use it in a strip galvanizing bath was made because of the beautiful finish. But the operators did not realize that there is no bending or deforming of buckets and tubs, so when the alloy was put into the strip coating metal bath, peeling and flaking of the coating developed on a very large scale. Intense interest was shown when the full spangle cracked right out of the coating as perfect as if cut out of a jig-saw puzzle. The effect of the antimony settled at the outlines of the beautiful frosted "Fern-Like" spangles, and caused the spangle to come out of the coating in its perfect form. The trouble was completely eliminated by changing galvanizing baths and eliminating the antimony, although of course the beautiful finish was eliminated too by the absence of the antimony in the new bath.

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The handling of metals and alloys would be an easy matter if only their effect upon the spangle were to be considered. There are, however, many other factors that must be taken into account. Among these are peeling and flaking of the coating; tarnish; low adherence; increase of destructive forces of corrosion when the coating is put into service, especially on work that is to go outdoors in the weather. Hardness of the coating; ductility; bending qualities, etc., may also be affected, so that it becomes not only a serious matter, but a very complicated matter to make these metal and alloy additions to the galvanizing bath. Additions may be all right in one field of galvanizing and the same additions be all wrong in another field of galvanizing. This means that it is absolutely essential that all effects of each metal must be thoroughly known and understood by the person making the additions to the bath.

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There is also another angle to these metal and alloy additions to the galvanizing bath, and that is the effect when added to galvanizing baths that do not produce a spangled finish on the product. Such qualities as smoothness, brightness, adherence, etc. are very valuable sales qualities, and the use of these metal and alloy additions on non-spangled

coatings often increases sales volume when the additions are properly made to the bath. The writer believes that many early failures of galvanized coatings have come from the failure of an inferior base metal, rather than the metal or alloy additions made to the galvanizing bath.

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Antimony and cadmium additions to the galvanizing bath both tend to close up the spangle. That is, if they are used alone, or in very large amounts the tendency is for the spangle to become smaller and smaller. Tin, additions, on the contrary, tend to open up the spangle. Thus in order to get the full effect of antimony and cadmium additions to the galvanizing bath it is also necessary to add some tin. All of these metals come to an equilibrium point in the bath, and the skill in adding them comes in adjusting the correct amounts of each so as to obtain the best effect from the standpoint of developing the most beautiful spangle. At the same time, it is essential not to add so much of any of them as to produce harmful effects either on the properties of the coatings, or on the resistance of the coating to corrosion after it has been placed in service.

Cadmium Additions to the Galvanizing Bath

The metal cadmium was briefly mentioned earlier, but at this time a fuller and clearer idea of the result of adding cadmium to coating metal will be given. The metal melts at 609.6 degrees F. It is a white metal and is much more ductile than the metal zinc. It is so soft that it will mark paper and can be cut with a knife. It is harder than tin and softer than zinc, standing between tin and gold. It crystallizes in hexagonal pyramids, and shows hexagon dendrites on the surface of an ingot cast in an iron mold. The metal shows no cleavage, the texture is compact, and the fracture brilliant and crystalline when pure, but fine-grained and dull when impure. It has more nearly the color of steel (silver white) than of tin (which possess a distinctly yellow cast), but it is usually described as having a "silver-white" color with a bluish tinge. Cadmium has a brilliant lustre when freshly cut or polished but becomes dull on exposure to the air for some weeks.

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Cadmium, generally, is not a regular addition to galvanizing bath coating metal. The very high cost of cadmium has made this prohibitive, although there are ways of obtaining cadmium at a comparatively very low cost. (Purchasing high cadmium slab zincs). It is often found very closely associated with the metal zinc and during the process of the recovery of metallic zinc, the cadmium present is also reduced and goes into the metal. Cadmium is often found in Remelt Zinc. This zinc is made from scrap Mason Jar lids, old refrigerator linings, punchings etc., name stencils, etc., which may carry considerable cadmium content. The cadmium is put in to soften the zinc so that it can be pressed and formed. It is not uncommon to find from .75 per cent to as high as 1 per cent of metallic cadmium in remelt zinc.

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An analysis of a remelt zinc is given below—

Zinc	**97.69**
Iron	**.05**
Lead	**.96**
Tin	**.56**
Cadmium	**.72**

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Cadmium imparts a silver lustre to the finish of zinc coatings and as has been mentioned before it develops the "Pearl" spangle, or very large "Fern-Like" crystal. When used with small amounts of tin to open the flower, the crystals are sometimes as big as 3 inches in size. Without tin additions, however, the cadmium alone will tend to close up the spangle and give small spangles and a dull finish.

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Cadmium, like tin, tends to make a galvanizing bath thin and fluid and less sticky. Generally, the amounts of cadmium added to the bath are very much under 1 per cent. The coating metal should not contain over 0.10 to 0.25 per cent, the amount depending to a large extent upon the finish desired, the other metals in the bath, and the size and lustre of the "Pearl" spangle desired. The chief fields of galvanizing that use cadmium in the bath are in sheet galvanizing, metal ware galvanizing, and in some non-spangled fields where a smooth bright metallic finish is desired.

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Metallic cadmium can be purchased in the open market, but the best way to obtain cadmium for galvanizing purposes, is simply to purchase slab zincs containing cadmium. There is an added advantage in this method also, in that the metal is very pure high quality zinc, and therefore greatly reduces dross production, and the metal used per ton of product. Thus the original first cost of purchasing the high quality cadmium carrying zinc, is offset in the end by the beneficial results of reducing the dross, improving the quality of the finish, and using less metal per ton of product.

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As with the other metals it is very hard to give exact and definite amounts of cadmium to add to the coating metal for galvanizing. Higher amounts can be used when aluminum and tin are present in the bath, but very large amounts of cadmium should never be added because there are many other effects induced into the coating other than the development of the beautiful "Pearl" spangle. A safe amount when other metals are not present is around 0.10 per cent, but with other metals in the bath, the amount may go up as high as 0.30 per cent with no harm. It is not recommended to go any higher than this high limit because of other effects that the metal cadmium has on the coating metal, and on the coating itself.

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Cadmium tends to thin out the galvanizing bath; give a lighter coating metal deposit, and on non-spangled work it gives a beautiful smooth metallic finish. In such baths as those used for centrifuge work, cadmium is extremely valuable in keeping the work, especially small articles, such as nails, etc. from sticking together in lumps. It can also replace the metal aluminum to give the desired smoothness and brightness to the finish, thereby keeping the bath thin and fluid.

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(*Please turn to page* 630)

"TEFLON" TETRAFLUOROETHYLENE RESIN AS A WIRE AND CABLE INSULATOR

by Bertren E. Ely
Product Specialist
Polychemicals Department
E. I. du Pont de Nemours & Co.
Wilmington, Delaware

We are indebted to the author for an exceptionally fine treatise on a new material that has a promising future as its production emerges from the pilot plant to a commercial basis. The material is one that is a "must" for some uses, but its qualities are certain to broaden its applications when it becomes more generally available.

The development by **du Pont** of "Teflon" tetrafluoroethylene resin as a wire and cable insulation has created a great deal of interest in recent years. This material has a combination of properties unknown to any other electrical insulation: high impact strength, which varies on the Izod scale from 2 foot-pounds per inch at —60°C to 6 foot-pounds per inch at 77°C; mechanical toughness; good abrasion resistance; insensitivity to moisture; exceptional electrical properties over the entire spectrum measured, 60 cycles to 30,000 megacycles; and an operating range from —60°C to 250°C. "Teflon" has excellent resistance to all known solvents and corrosive materials, with the exception of molten alkali metals, and fluorine and chlorine trifluoride under special conditions. Thin films of "Teflon" can be handled easily in automatic winding machines because of their flexibility, toughness, and ability to stretch, which makes practical the application of tape over sharp bends. Furthermore, the elastic memory of the plastic causes it to fit tightly on the conductor as the temperature is raised.

* * *

This relatively new member of the plastics family was discovered in the du Pont laboratories about 1940, and during the war the entire pilot-plant production of this material was limited to military and defense applications. The development of the broader potentialities of the compound as an insulating material started immediately after the war. Today it is being used as a wire insulation for specific applications where its exceptional properties are required. In April 1951 the National Production Authority placed "Teflon" on allocation under NPA General Order M-45, Schedule 2, as an Appendix A material.

* * *

Properties (See Table I)

The material is made by polymerizing gaseous tetrafluoroethylene to produce a long straight-chain polymer. The chemical equation for this process is:

$$n\,\begin{matrix}(F & F)\\ (C & C)\\ (F & F)\end{matrix} \rightarrow \begin{matrix}F & F & F & F\\ -C & -C & -C & -C-\\ F & F & F & F\end{matrix}$$

The bonding forces between carbon and fluorine are among the strongest known to the physical chemist, and laboratory investigations have shown that the polymer consists of closely packed molecules.

TABLE I -- TYPICAL PROPERTIES OF "TEFLON"

(Data given represent standard commercial grades of material and standard methods of testing except where otherwise noted)

PROPERTY	VALUE	METHOD
Specific gravity	2.1-2.3	D792-44T
Tensile strength at 25°C, psi	1500-2500	(1) D638-44T
Elongation at 25°C, %	100-200	D638-44T
Flexural strength at 25°C, psi	2000	(2) D650-42T
Stiffness at 25°C, psi (0.125 in.)	60,000	D747-43T
Impact strength, Izod, -60, 25, 77°C, ft-lb/in.	2.0 4.0 6.0	D256-41T
Hardness, "D", Durometer	55-70	---
Compressive strength, psi, at 0.1% deformation	1700	D695-42T
Deformation under load at 50°C under 1200 psi, % in 85 hr	4-8	D621-43
Heat-distortion temperature, low-load, °F	270	D648 (B)-44T
Specific heat, BTU/lb/°F	0.25	(3)
Coefficient of linear expansion per °F (77-140°F)	5.5×10^{-5}	D696-42T
Thermal conductivity, BTU/hr/ft^2/°F/in. (0.18 in.)	1.7	(4) Arl. P-32
Dielectric strength, short-time, volt/mil (0.080 in.)	400-500	(5) D149-40T
Surface arc-resistance, seconds	700	(6) D495-42
Volume resistivity, ohm-cm	10^{16}	D257-38
Surface resistivity at 100% rel. humidity, megohms	3.6×10^6	D257-38
Dielectric constant at 60, 10^3, 10^6, 10^8 cycles	2.0-2.05	D150-40T
Power factor at 60, 10^3, 10^6, 10^8 cycles	0.0005	D150-40T
Water-absorption, %	0.00	(7) D570-42
Static coefficient of friction against polished steel	0.09-0.12	(8)
Vapor pressure, mm Hg at 25°C	10^{-6}	
Outdoor weathering	no detectable change in 6 years	

(1) Tensile strength in oriented film may be as high as 15,000 psi.
(2) Specimens do not break.
(3) Method of mixtures.
(4) Cenco-Fitch apparatus.
(5) 1000-2000 volts/mil in thicknesses 5 to 12 mils.
(6) Does not track.
(7) Not wet by water unless a surface-active agent is added.
(8) Inclined-plane method.

These facts account for its outstanding properties.

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The most striking property is its thermal operating range, —60°C to 250°C. At temperatures below 327°C it is in the crystalline state; at 327°C (the sintering temperature) the crystalline structure disappears and the plastic becomes an amorphous gel which is extremely tough. The material does not melt at higher temperatures, but it slowly decomposes, to emit fluorine-containing compounds. Some of these compounds may be toxic if breathed. However, there is no record of a fatality caused by exposure to the decomposition products of "Teflon". In some cases, individuals accidentally exposed to these gases have experienced rises in temperature and "shakes" similar to those which occur in attacks of malaria. The severity of an attack can be minimized by oxygen treatment. Adequate ventilation will eliminate the danger to personnel working with the material at elevated temperatures. Although small amounts of gases are given off in the vicinity of 200°C, rapid decomposition does not begin until the temperature is raised above 350°C. For a 1-kilogram sample of material, at 200°C, it is calculated that the weight loss would be 1% in sixteen years and at 350°C, 13% of the weight would be lost in one year.

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The chemical resistance of this tetrafluoroethylene resin is exceptional. It has been boiled in a variety of chemicals, such as halogenated hydrocarbons, ketones, alcohols, ethers, hydrochloric acid, hydrofluoric acid, sulfuric acid, and aqua regia, without showing any signs of swelling, loss of weight, or change in properties. In addition, the material is completely insensitive to water. It is very non-adhesive, and to date no cement has been found which will bond the material with any strength. This non-adhesive property has been used to advantage where non-sticky surfaces are required.

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One of the essential considerations in any wire insulation is its mechanical properties. It has a high impact strength over a wide range of temperatures. The Izod test shows values of 2, 4, and 6 foot-pounds per inch at temperatures of —60°C, 25°C, and 77°C, respectively. Although the hardness of the material is only 55-70 on the D Durometer scale, it is self-lubricating, and this property results in very good abrasion-resistance. It is showing exceptional life in some applications where much harder materials are abraded rapidly. Mechanical toughness is essential in any insulation, and combination of tensile strength and elongation of "Teflon" permit it to be used in the rotating-drum type of automatic winding machines, which subject the wrapping tapes to extremely rigorous treatment. The thermal stability of "Teflon" below the sintering temperature is very good; at 250°C the loss in tensile strength is negligible over long periods. At 300°C the tensile strength of molded bars will drop only 10-20 per cent in one month. Initially, the material deforms rapidly under compression, depending on the temperature and the amount of load which is applied. However, after a few seconds there is no further change unless the temperature or loading is raised. Like most plastics, it has a plastic memory, and the material tends to recover when the deforming load is removed. This property is very desirable in a taping operation, since the material is applied under tension, and it will fit more tightly on the conductor as the temperature is raised.

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The electric properties are outstanding. Low loss, low dielectric constant, and good dielectric strength make it a superior insulation in many applications. The loss factor, 0.0005, does not vary over the entire spectrum measured to date, 60 cycles to 30,000 megacycles, and the loss and dielectric constant are unaffected by temperature changes up to at least 250°C. The volume resistivity is unaffected by moisture. On exposure to an arc, it leaves no carbonized path or "track". As soon as the arc is extinguished, the full insulation strength is restored.

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Forms of "Teflon" Tetrafluoroethylene Resin

"Teflon" is produced as a granular polymer with average particle size 20 to 30 mesh; an aqueous dispersion with particle size of approximately one-quarter micron; and a lubricated dispersion powder. The latter is made by coagulating the dispersion, drying the powder and lubricating the dry powder with a volatile light oil. Aside from these basic materials, there are several other forms of "Teflon" which are of importance to the wire and cable industry. Unsupported tape is shaved from cylinders which have been molded from the granular polymer. Continuous film in thicknesses of 2 to 60 mils, and from ¼ to 12 inches wide, is made in this way. A very good electrical-grade tape can be made by extruding the lubricated dispersion powder. Coated glass fabrics are made by dip-coating processes, using the "Teflon" dispersion, and the Fabrics and Finishes Department of the du Pont Company offers a series of metal-primers and wire enamels made from the dispersion. All of the forms of this tetrafluoroethylene resin which we have mentioned are used in the wire and cable industry.

Methods of Application

Unsupported films of the material and coated glass fabrics are used as taping materials in many modern wire insulations. The thin tapes which are shaved from molded cylinders have sufficient elongation and toughness to withstand the rigorous treatment of automatic winding machines. In most wire constructions the tape is applied with a two-thirds lap, or a double serving of half lap, and the elastic memory of the material makes it shrink very tightly onto the wire as the operating temperature is increased. Since the material exhibits practically no adhesion, even to itself, glass braid is often applied over the tape to hold the insulation in place. Unsupported tape has found widespread use as the barrier insulation in coaxial cables.

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Granular polymer is applied onto wires by two methods. The process which was studied first is screw extrusion. It cannot be handled by the

conventional extruder techniques in which the material is heated as it is conveyed forward by the screw. Mechanical working of the tetrafluoroethylene resin in the gel state will result in strain cracks in the finished coating. Consequently, the method which has been developed for extruding it as a granular powder consists of advancing the cold polymer by the extruder screw into a die having a long land, where the material is heated above the sintering temperature. The die is mounted at a 45° angle to the screw, and the extrusion pressure pushes the wire through the die. Early studies showed that this process is feasible only for applying heavy coatings, and the best rates of operation were in the neighborhood of six linear feet per hour. There are some indications that screw extrusion of it would be more attractive if the wire were run through the screw directly into a die rather than using a crosshead die.

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The most recent development for insulating wire with the compound is the three-dimensional calendering process (Figure 1). Granular polymer is fed to a pair of grooved rolls with the conductors running through the grooves. The polymer is cold-pressed around the wires and then sintered to produce a smooth, continuous coating. The experimental unit coats eight conductors simultaneously, and the rates have been limited to eight feet per minute by the sintering facilities. Wire has been coated at linear speeds in excess of fifteen feet per minute without sintering. This process is still in the developmental stage, with the work directed to the coating of solid round conductors 51 mils in diameter. Some preliminary work shows that the calendering process is very promising for coating rectangular conductors with the tetrafluoroethylene resin.

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"Teflon" wire enamels were introduced by the Finishes Division of the du Pont Company to the wire coating industry on an experimental basis about two to three years ago. Commercial production methods were rapidly developed and several manufacturers are now in regular production of "Teflon" coated magnet wire. Others are beginning to investigate the possibilities, and it is expected that more widespread use of the material as wire enamels will soon be a fact.

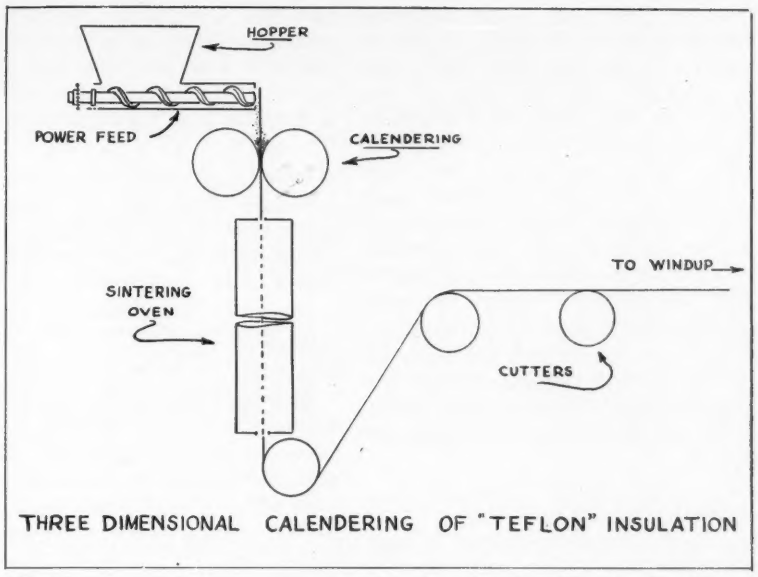

Fig. I.

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These wire enamels are applied on regular industrial wire coating

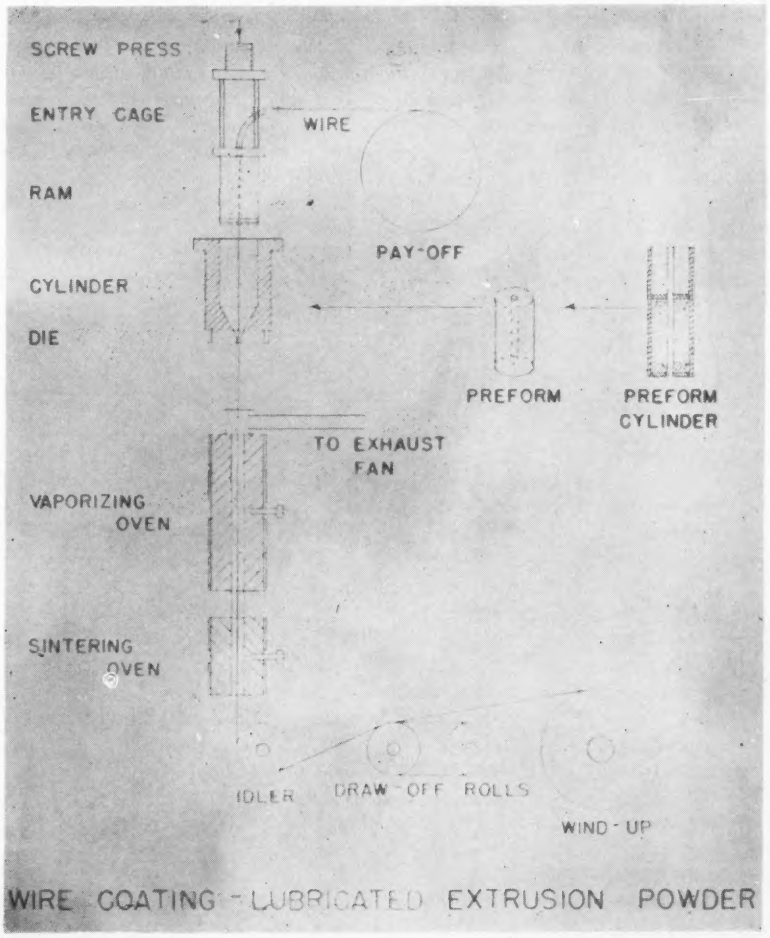

Figure II.

machines, although some modification is necessary to reduce agitation and mechanical working, which tend to coagulate the material, at the point of application. In addition, fusing or baking temperatures somewhat higher than normal are often required. The usual procedure is to apply a special "Teflon" wire enamel primer, which promotes adhesion and improves certain other qualities, and then to apply several coats of "Teflon" wire enamel, building up the film to the desired thickness. A variety of wire coating systems has been made available so that individual special requirements can be met.

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Another product is also growing in importance; namely, such enamel for glass-served wire and cable. Its functions are to bind and protect the glass serving or braid, to increase abrasion resistance, and to facilitate handling of the finished wire. Dielectric strength, oil and moisture resistance are also improved.

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Wire enamels of this tetrafluoroethylene resin possess all the good qualities described elsewhere in this article, including high temperature stability (200 degrees C. continuous; 250 degrees C., or higher, intermittent), high dielectric strength, low power factor, very low space factor, extremely good flexibility, excellent continuity, good heat shock and heat aging characteristics, and superior chemical and solvent resistance. One minor deficiency is relatively low abrasion resistance, but this has generally been overcome by the exercise of a little care in processing of the finished wire.

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Wire and cable protected with this wire enamel or the enamel for glass-served wire and cable is expensive, but the high cost has been found to be well-justified for many important military applications, and for a growing list of civilian uses.

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These coating in the range of 10-60 mils thick are applied by ram extrusion of the lubricated dispersion powder. See Figure II. (See page 581.) This process is similar to the lead-press technique; a preform of the powder is made by using slightly more than hand pressure on the mold. A rod is kept in the center of the preform in order to provide a path for stringing the wire. These preforms usually consists of three or five pounds of the lubricated powder, which is 80% "Teflon" and 20% lubricant. The preform is placed in the cylinder of the ram unit and wire is strung through the system. The ram is advanced at a very slow rate and the lubricated powder is forced out of a heated die onto the wire. Die temperatures are 60-95°C. The final steps in the process are the removal of the lubricant and the sintering of the material to produce a continuous coat. The limiting factor in the wire rate in this process has been the oven facilities rather than the extruder, and the thickness of coatings is limited by the ability to remove the lubricant without sintering the material. Our experimental unit has been operated at only about fifteen feet per minute.

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From this discussion, it is obvious that the tetrafluoroethylene resin does not behave like the other thermoplastics. The processes which have been developed for handling the material are not the conventional methods with which the wire and cable industry is familiar. However, the fabrication of this resin has improved greatly in the past few years, and the current work in the du Pont laboratories promises even greater improvements in the future. As a wire and cable insulator the electrical industry is assured of attaining one of its most elusive goals: wire which can operate continuously and satisfactorily at 200° to 250°C. Using "Teflon" insulated conductors, electrical equipment can be constructed which will be lower in weight, smaller in size, and higher in efficiency than present equipment. The life of normal-temperature equipment will be increased, and lower maintenance costs and improved performance will be realized. The substance provides the engineer with a material which has thermal, chemical, and electrical properties not available in any other insulating material.

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PLEASE NOTE THIS IMPORTANT CHANGE
In the Dates for THE ANNUAL CONVENTION of
THE WIRE ASSOCIATION
1952 CONVENTION from NOVEMBER 10th-13th
THE PLACE CLEVELAND, OHIO
HEADQUARTERS
THE CARTER HOTEL
Better Make Your Plans Now to be There
THE WIRE ASSOCIATION
RICHARD E. BROWN
Executive Secretary
453 MAIN ST. STAMFORD, CONN.

CABLE KNITTING AND ITS ADVANTAGES

by Vernon L. Pinnock
Southport, Lancastershire
England

In this presentation of the points that favor the use of knitting machines in covering electric wire and cable, the author stresses simplicity of the operation, speed of covering and economic factors. All are interrelated. He makes a good case worthy of consideration.

Knitting, once a term applied solely to the manufacture of underwear, frocks, and so forth, is fast finding its place in the fabrication of electric cable. Hitherto, most National Standards Institutes have specified that the yarn cover on flexibles and similar cable must be braided, insisting that the braided cover alone is capable of providing satisfactory results. It has never been in doubt that the braided cover is excellent in all its aspects, but the braiding machine is slow in performance, cumbersome and expensive to operate.

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After many years of extensive research, firms in America and Europe have developed a form of knitting machine which applies knitted sheathes to cable cores, taking the place of that previously braided. Tests have proved this cover very satisfactory and the Underwriters Laboratories have reported that it has proved equal or superior in tests for moisture, absorption, flame, flexibility, abrasion, insulation and construction. The knitted cover has been approved by the American Standards Association, Association of American Railroads, and the Canadian Standards Association and in 1950 these standards were revised accordingly.

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The knitting machine is simple in the extreme. It consists of a haul-off capstan designed to pull the cable through one or more heads, each applying a knitted sheath. These heads are arranged co-axially, each head revolving in the opposite direction to the one preceding it. The stitches are spirally disposed around the conducting wire, instead of being straight, so that the resultant cover has maximum flexibility and prevents rupture of the yarn. Each yarn can be tensioned according to requirements so that a tight cover can be applied to prevent the cotton envelopes slipping back along the conductor when cut in short lengths for use. Each head contains a number of latch needles, usually eight, which are made to move longitudinally by cams to produce the knitting action. Power requirements are very modest and the whole machine is almost noiseless in operation.

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Not only has the knitted cover been proved at least of parallel efficiency to its braided counterpart, but it can be produced on special machines at less cost and at a far greater speed. By comparison, the braiding machine is in many ways obsolete, since it embodies a greater number of mechanical features which, of necessity, restrict its performance. Due to the nature of the braided stitch, the yarn supply packages have to be fitted to the machine carriers or spindles, thus reducing the size of the package to such that they will pass each other freely as they proceed around the race track. This naturally limits the capacity of yarn supply and, in turn, the length of a continuous run without replenishment. In direct contrast, the knitting machine is fed from stationary supply cheeses placed on creels within easy reach of the operator. This being so, the size of yarn package is restricted only to that which can be conveniently handled. This considerable advantage is reflected, as stated above, in an enormous increase in the continuous running time without stopping down for yarn replenishment. On one type of machine it is possible to operate continuously for 17 hours using standard cone cheeses weighing 1¼ lbs each, sufficient to cover 20,400 feet of vulcanized india rubber cable (3/.029).

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Furthermore, there is no need for the yarn to be rewound onto bobbins or parallel cheeses since the knitter is capable of taking its feed from large cone cheeses delivered by the spinner. This dispenses with one entire operation, resulting in a considerable saving in re-winding cost.

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Far less floor space is required for knitting machines if production per unit area form the basis of comparison. Naturally, the actual area involved differs with each manufacturer's product, but it is safe to estimate that only 1/3 of the floor area is needed for knitting machines than would be required to equal similar production on braiders.

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Production is, of course, the major factor and here the knitting machine plays havoc with past braiding records. Individual makers claim a variety of production figures for their machines but much naturally depends upon the closeness of this stitch if a fair comparison is to be made. The haul-off capstan speed can be increased to give greater production, but only to the point where the resultant cover does not become inferior to the braided form. It is, therefore, not fair to state that the knitting machine is five or ten times faster than a braiding machine, unless a parallel be drawn with a similar braided cover for matching specification. One manufacturer makes such a comparison with 3/.029" cable, stating that a 16-carrier braiding machine of the Maypole type would produce, let us say, 200 feet of cable in one hour, whereas a knitting machine would

(*Please turn to page* 630)

SETTING WIRE TENSIONS WITH TENSION METERS

by Dr. Erwin J. Saxl, President
Saxl Instrument Company
Harvard, Massachusetts

While in this article the author describes the importance of proper tensions in coil winding and a method by which proper tensions may be checked, he also indicates that the same method may be used for yarns to be served onto wires in insulating operations. Where proper tensions are known in advance, this method may be used to see that the serving or winding tensioning devices on the machine are correctly set to produce uniform windings and avoid either breakage or too loose an application of the wire or yarn.

In the making of wires and wire products one common influencing factor enters every processing operation: this is the tension at which the wire is handled. Whether the wire is drawn to a smaller diameter, whether it is enameled, tinned, or whether it is wound into coils of smaller or larger size, it is the tension of the wire which decides whether the effective wire diameter is reduced, formed, or otherwise prepared. The tension influences the ultimate speed of the run of the processing operation and the electrical resistance and physical compactness of the coil or other wire product. Last but not least, it alters not only the wire's mechanical but also its electromagnetic characteristics and crystallographic structure.

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The smallest common denominator that controls the effectiveness of the wire-preparatory operations is, ultimately, the safe tension with which a given process can be run. If the tension is excessive the wire breaks and has to be butt welded resulting in down-time of the machine and a pieced-up wire of lower quality. On the other hand, if the tension is not sufficiently high, the machines are not running at their greatest efficiency thereby increasing the cost of direct labor and overhead per foot of wire and the coil or other wire-product is loose.

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Between the one extreme of the broken wire and the other of excessive production cost and insufficient compactness of the coil, there is a comparatively limited range of correct tension that must be maintained for the most ecomical production and the highest quality of the wire goods.

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In many instances the best tensions are well known by experience to the operator of the respective positions who has personally supervised his frames for a considerable length of time. Knowing this tension to be practical there then exists the desire to reproduce the same tensions at a future date. Moreover, it is particularly necessary that the same correct tensions be used on all other positions producing the same type of wire goods. Thus the measurement of tension in order to reproduce it and maintain it answers a practical purpose of real significance.

Fig. 1—The Saxl Tension Meter.

The Tension Meter

What then can be done towards maintaining the tension uniformly and making such settings as will maintain the right tension? In connection with this, reference is made to a Tension Measure Instrument called the Tension Meter shown in the subsequent Figure 1. This is a simple, hand-operated, dial indicator which can be quickly inserted in the path of the running wire by simple trigger action.

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Figure 2 shows the close up of this trigger-operated, pistol-grip instrument. The running wire or similar filamentous material is easily inserted between the three rollers of the Meter with the aid of a

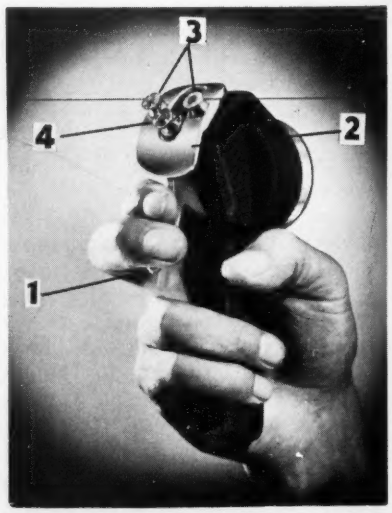


Fig. 2—Trigger Operation of Tension Meter.

trigger (1) which contains an automatic guide (2). By pulling the trigger down (preferably with the index and middle fingers) the two outer guide rollers (3) are lowered, permitting quick insertion of the wire by pressing the shield against the wire and releasing the trigger. Then the wire, upon release of the trigger, falls automatically between the two outer guide rollers (3) and the sensitive center roller (4). The rollers are recessed into the trigger and thereby, upon release of the trigger, the wire is brought automatically into measuring position within the pulleys. The trigger should be released gently, allowing the wire to slide into the grooves of the guide rollers and against the center roller which in turn is lifted according to the tension of the yarn. The three rollers which are designed to turn smoothly on ball bearings are free from runout. They maintain the correct angle at which the wire passes the center roller, regardless of how the Meter is tilted. The movement is so balanced that the Meter will operate properly in any position.

★ ★ ★

The Tension Meter shown is calibrated in grams tension, and has an unusual wide range. Depending upon the capacity of the Meter, it covers the range to either 0—125, 250 or 1000 grams.

★ ★ ★

The motion impressed upon the sensitive center feeler between tension of the wire results in a deflection of the center roller. This angular motion is purposely kept to a minimum for the following reason:

★ ★ ★

It is well known that the elastic recovery of a deformed body is the more complete, the smaller the deflection of the latter from its rest position. For this reason lasting accuracy of the restraining spring within the Tension Meter is assured by keeping the spring deflection to a minimum. This smaller motion thereafter is amplified through a special gear train with zero backlash and the enlarged angular motion is indicated by a pointer rotating over the dial. The dial is calibrated in sharp and clear lettering.

★ ★ ★

The pointer of the instrument is engraved on a transparent flywheel. The inertia of the latter prevents excessive oscillation of the indicator and makes it possible to get practical readings even on vibrating and reciprocating machinery. The dial faces the operator directly, allowing instant readings without eye strain. The trigger operation and the automatic wire guide make quick insertion possible with one hand only. The compact design of the roller assembly allows the Tension Meter to be used in many tight places ordinarily inaccessible.

Proper Tensions Improve Coils

Questions of tension enter measurement (and subsequent control) particularly in coil winding where deviations in size as well as of the electromagnetic conditions are produced when coils that are supposed to be identical are wound with different tensions, since tension influences the effective diameter of the coil and the cross section of the strained wire. The Tension Meter also may be used to improve wire wound resistors, small transformer coils, helical grids for radio and television tubes, windings for rheostats, potentiometers, magnets, earphones, etc. By maintenance of correct tensions, uniformly dense coils are delivered, better nesting is achieved, and breakage and thin places caused by overstretching are avoided.

★ ★ ★

Tension measurement (and proper adjustment, after the tension is known) while of importance in coil winding operations, becomes practically imperative in the operation of wire products where the diameter is critical. Reference is especially made to the drawing of small filament wires such as are used in incandescent lamps and in the filaments of radio tubes. Here excessive tensions mean lowering the wire diameter. In turn, these spots of small diameter cross section are the potential sources of premature burn-out and lower mechanical strength, a dangerous condition particularly under military requirements.

★ ★ ★

In all these instances wire breakage can be practically reduced to the unavoidable minimum by adjusting the tension in such a manner that it is never beyond the practical operating limits of a given wire (considering both its chemical constituents and physical structure).

★ ★ ★

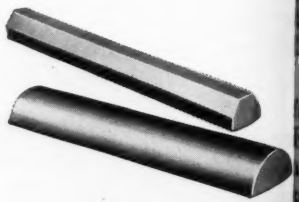
The finer the wire, the more this effect is accentuated, particularly when the wires have a diameter of a few thousandths of an inch only, such as are needed in up-to-date electronic set-ups, fine ammeters, galvanometers, certain radar and transducer parts and similar equipment. Uniformity of tension during the winding of the accurate coils means here that the coils produced in this manner are assured of the same mechanical size and thereby nest more closely and with narrower limits of tolerance within the spaces designed for them in an assembly. Closer mechanical limits in turn mean better electronic characteristics and thus the production of electronic devices of greater accuracy and output. Also in wire-covering machines, maintenance of standard tensions means freedom from insufficiently covered wires and better use and yield of both the wire and the materials covering same, such as textile yarns, synthetics, etc.

Full Coil Versus Empty Coil

A further instance of tension measurement indicating the necessity of subsequent adjustment of the tensioning devices occurs during the building-up of the coils, each of which consists of a substantial number of layers that are separated from each other as a rule by oil-paper or its equivalent. There is a difference in tension between the inner layers of smaller coil-diameter as compared to the outer layers of larger diameters. The question of the build-up of the coils as such not only enters but there is also the correlated feature of the variable tension of the wire issued by the magazine spool from which the wire is delivered and which is usually restrained against unwinding by a friction band or other standard frictional braking device.

★ ★ ★

For bonus tonnage

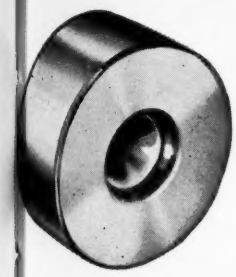


Carboloy Special-Shape Dies

Rough-cored, rough-drilled, or finished. Prompt quotations. Just send "specs" on your special-shape job. Get that Carboloy bonus tonnage!

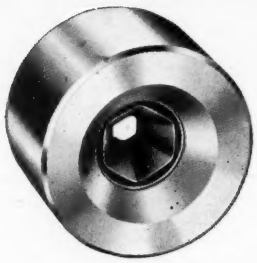
Specify **CARBOLOY**

CEMENTED CARBIDE WIRE, BAR, AND TUBE DRAWING DIES



Carboloy Round-Hole Dies

Exclusive hot-forge casing process gives greater over-all strength and compressive backing. They work harder, hold up longer. Bonus tonnage!

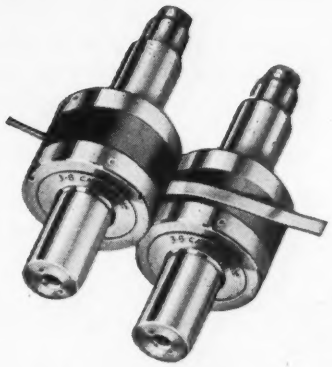


Carboloy Hex Dies

Feature larger bell openings, permit better lubrication. Work harder, hold up longer, give better-shaped rods of any material. Bonus tonnage!

Carboloy Capstan Rings

Pull wire through die, resist wear of severe tension and abrasion, help keep your production rolling. Work harder, hold up longer. Bonus tonnage!



Carboloy Wire-Flattening Rolls

Provide accurate sizing and finishing as round wire is rolled into the specified flat strip. Work harder, hold up longer. More Carboloy bonus tonnage!

cutdowntime with Carboloy Wire Dies

HOUR AFTER HOUR, there's extra tonnage for you in drawing with Carboloy Wire Dies.

Made of Carboloy Cemented Carbide, hardest metal made by man, they're designed with the stamina to stay on the job to the last full second of performance in every hole size. And every saving in downtime increases your bonus tonnage.

Extra services, too

The broad Carboloy service program helps you get out of Carboloy Wire Dies all the famous Carboloy performance.

Carboloy Die Service Centers, for example, and Carboloy Field Engineers are both ready with any help you need on die service problems. Behind them lie all the Carboloy *factory* carbide-die experts and facilities.

Large standard die stocks are yours for fast tapping in Detroit, Los Angeles, Chicago and Pittsburgh. You save hours, or days, on deliveries of vital dies, cut downtime to the bone.

The Carboloy tuition-free Customer Training School (Detroit) helps train your key men in 3- or 5-day concentrated courses. Gives them latest helps on carbide draw dies, maintenance methods, die-room operation. Helps get your carbide program on a money-saving, high-gear basis. Gives *you* more productive personnel, as well.

Finally, the free Carboloy Die Service Manual D-119 makes die-handling helps available to men in your plant. It's 64 pages, crammed with information.

Write for catalog or services today! Get that Carboloy bonus tonnage!

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

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PLANTS AT DETROIT, MICHIGAN; EDMORE, MICHIGAN; AND SCHENECTADY, NEW YORK

When a coil is wound under this varying set of conditions, the friction of the pull-off increases, see Figure 3 (because the coil in production builds up to a large diameter while being rotated from a mandrel of uniform speed). This all involves a set of complex conditions whereby the coil rarely ends up with the same tension with which it was started.

★ ★ ★

The basic relation between the tension on a wire that unwinds from a coil against a frictional resistance of said coil which we shall assume to be constant is as follows:

Referring to Figure 3, let R be the radius of the coil. To pull the wire off the same tension (t) is required. In other words, the work done in unwinding the coil A during a unit time interval is represented by the area R.t.

Inversely, in the instance of coil B. The radius of the coil of remaining wire has been reduced to one half the size of R. The radius of coil B is now r.

Assuming the resistance against pulling off of the coil to be the same as before, then the tension required to overcome this identical resistance is now twice as high because the lever (R) has been reduced to one half its size (r).

Hence we can state as follows:

$$R.t = r.T$$

★ ★ ★

In both instances the same amount of work is necessary to pull the yarn off. However, as the coil from which the wire originates decreases in size, the tension necessary to unwind it becomes larger. It is up to the skilled operator then to choose such a set-up and make, with the aid of the Tension Meter, such adjustments as will keep his tensions throughout the entire winding operations within practical limits.*

★ ★ ★

Here again a happy medium may be reached by inserting the Tension Meter into the running wire and making adjustments of the several variables of the coil-winding mechanisms so that the tension at the inner layers of the coil is similar, within accepted limits of tolerance, to the tension at which the outer layers of the wire are wound. In this manner excessive as well as insufficient pressure of the outer coils is avoided and a more uniform coil produced, both in mechanical size and electromagnetic characteristics.

★ ★ ★

Once the proper tension is known, it can be reproduced at a later date by merely referring to a filing card, a record book, or other place of permanent notation. Moreover the tension can be set up again not only in the original position in which it was measured, but it can also be transferred to any of the many other positions that run the same type of material. Thus from spool to spool and coil to coil, more uniform tensions can be used in the production of wound, drawn or otherwise processed wire resulting in better quality, faster production, better utilization of a given quantity of materials, and fewer rejects, giving a better wire product at lower cost by measuring and thereafter controlling the tensions.

★ ★ ★

Fig. 3

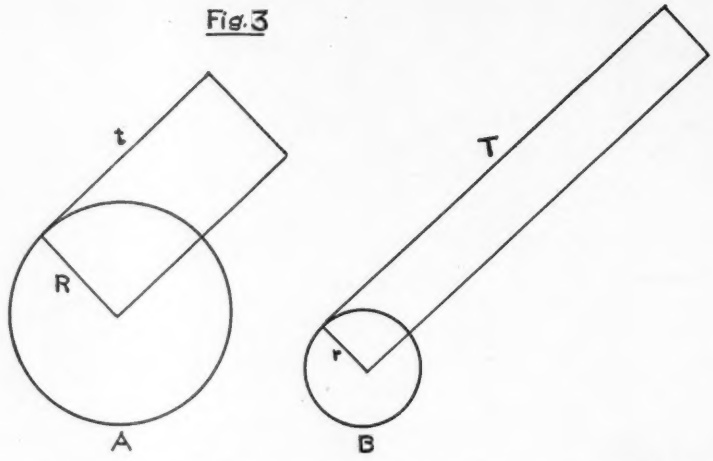

Fig. 3—The Tension Changes in Pulling Wire Off a Full Coil (A) as Compared with an Empty Coil (B).

***Actually the relation of resistance of the rotary motion as a function of reduced coil diameter is more involved.**

This is due primarily to the fact that the RPM of the spools change in unwinding. This variation of rotational speed influences the frictional resistance of the band brake or other frictional devices. The frictional resistance of a brake is not precisely the same in the instance of a full spool rotating slowly as compared to an almost empty spool rotating more quickly for the same number of feet of wire pulled off same per time unit.

The above, therefore, shall serve merely as a first approximation and shall not be interpreted to offer a complete mathematical solution for the complex multitude of variables that influence the tensions during winding operations.

Where can I get it?

Look in the BUYERS' GUIDE, of course.

Do YOU have a copy of the WIRE AND WIRE PRODUCTS BUYERS' GUIDE on your desk?

It will tell you quickly where you can locate the manufacturers of machinery, equipment, supplies, rods, wire, strip, billets, bars, etc., in its over 30,000 classified listings.

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Government Wire Production Information

Chromium Resources to be Developed

Deposits which contain about 80 per cent of the Nation's known chrome ore will be developed for the production of chrome concentrates used in the manufacture of high-grade steel vital to the defense program.

★ ★ ★

Under terms of a contract negotiated by DMPA with the **American Chrome Co.**, whose main offices are in San Francisco, California, the company will develop, equip and put into production the Mouat Mines in Stillwater County, Montana. Development of this property, including construction of plant facilities, housing, streets, utilities and other improvements, was begun in the early part of World War II. It was abandoned when it became apparent that sufficient supplies of chrome for immediate needs could be obtained from sources abroad.

★ ★ ★

Production is expected to begin within a year, after which the company agrees to supply 900,000 tons of chrome concentrates during the ensuing eight-year period. The basic price to be paid for the product, which must contain at least 38 per cent chromic oxide, is $34.97 per ton.

★ ★ ★

Domestic production of chrome in 1951 amounted to 7,500 tons, while imports totalled 1,400,000 tons.

★ ★ ★

The company agrees to supply working capital of $950,000, while DMPA will provide a Government advance against production in a similar amount, at 4 per cent interest. In addition, the Government will supply up to $1,815,000 worth of equipment on a loan basis.

Aluminum

World production of aluminum is expected to reach 2.7 million metric tons by 1955 if current expansion plans are carried through to completion.

★ ★ ★

This is the estimate given to shareholders of Aluminum Industrie AG, Swiss aluminum firm, at a general meeting held in Zurich recently. The report to stockholders pointed out that world aluminum output increased from 600,000 tons annually in 1938 to 1.8 million tons in 1951.

★ ★ ★

The report also brought out the manner in which the balance of production has shifted from the old world to the new in the thirteen year period. In 1938, for example, European aluminum production amounted to 57% of total output the world over, that year. United States and Canada produced 33%.

MICROMETER PRECISION MICRO-WELD TRADE MARK REGISTERED

MODEL M-T, FOR BENCH MOUNTING

This welder was designed and developed expressly for welding all types of fine wire: Aluminum, Copper, Brass, Bronze, Steel and Steel Alloys, ranging in size from .005" to .020" diameter.

Unit design of frame, transformer and power sub-assemblies permit other range of sizes to suit requirements.

Equipped with a temperature indicating annealing and tempering device, voltage regulator and meter to compensate for voltage fluctuation, wire cutters, extra large 5" diameter magnifying glass, fluorescent light and extension cord. Welder can be supplied for bench mounting, or mounted on 4-wheel truck.

The adaptability of this unit for welding all types of wire, either ferrous or non-ferrous, in sizes from .005" to .020" diameter, makes it ideal for the fine wire manufacturer.

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FOR SPECIALTY WIRES
A SPECIALTY MILL...

Johnson plants in Worcester, Akron and Los Angeles are specialty mills, equipped for the development of specialty wires. All wire drawn in these plants is always under strict laboratory control all the way from the basic material to finished product.

JOHNSON
JOHNSON STEEL and WIRE CO., INC.
Worcester 1, Massachusetts
New York Philadelphia Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto
SUBSIDIARY OF PITTSBURGH STEEL COMPANY

But in 1951, this had shifted to such an extent that Europeans made only 20% of the primary aluminum smelted by all producers. The United States and Canada, however, had increased their share to 66%.

★ ★ ★

With the advent of new smelters this year and next, plus the new Kitimat smelter of Aluminum Company of Canada, the percentage of total world aluminum produced by the North American companies should show even further increase.

Lead

The situation in lead in April was substantially unchanged with no new developments reported in the trade. Demand continues light with consumers adhering to a cautious buying policy and watching inventories which are being kept down. Fair tonnages have already been placed for May shipment, but sellers report that quite a few consumers are still to be heard from in respect to May metal.

★ ★ ★

There were no changes reported in the range on the smelting charge for battery plates which is at $52.50 to $55.00 a ton delivered buyer's works in the East.

★ ★ ★

The export market continues dull and unchanged at 18.50c, f.a.s. Gulf ports.

★ ★ ★

While there are some observers in London who consider that the fact that the United States stockpile has acquired something like 110,000 to 120,000 tons of lead in the last few months, and is probably prepared to buy some further tonnage there should be sufficient to have relieved the market of any burdensome surplus. It cannot be said that general opinion with regard to the metal is favorable. As far as the U.K. is concerned there is no very heavy pressure of demand at the present time and most users are buying only on a hand-to-mouth basis. In the open market on the Continent metal continues to be quoted at well below the U.K. official price, but there does not seem to be very substantial tonnage either offered or changing hands.

★ ★ ★

U.K. pig lead imports in March at 14,523 tons were not on an exceptionally heavy scale but it is noticeable that in the first quarter of the year arrivals here aggregated 63,647 tons, compared with as little as 19,671 tons in the corresponding period of 1951.

★ ★ ★

The shortage which was beginning to make itself very apparent this time last year seems most unlikely to be repeated during the current year. If the official price basis is maintained for a further period it is quite possible that there will be some revival in buying as, almost certainly, in the last three or four months consumers have to quite an appreciable extent lived on their stocks. Much will probably depend upon how much, and how fast, the U. S. stockpile is prepared to take in lead.

Latest Developments in Shell Mold Casting Process

The latest technical and patent developments in the shell-mold or "C" process for producing precision metal castings are presented in a report just released by the **Office of Technical Services, U. S. Department of Commerce.**

★ ★ ★

The shell-mold process of making metal castings uses plastics instead of clay to bind the sand particles into a mold. Originated in Germany during World War II and further developed in the U.S., the process uses a thin (shell) mold in contrast to the much thicker earlier sand molds. This results in a casting which is more accurate and of smoother surface, and requires less finishing than castings produced by the earlier sand mold process.

★ ★ ★

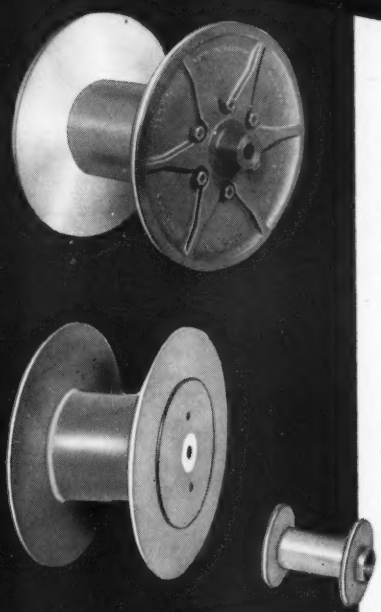
Widespread development of the process since World War II has resulted in many technical advances and a complicated patent situation. Prepared by a research metallurgist of the Office of Technical Services, this report discusses: Quality of the Cast Metal Product, Relation of Methods to Other Industrial Processes, Patent Developments in Germany, Patent Developments in the U.S., Technical Methods, Dimensional Accuracy and Surface Smoothing, Metals and Casting Size

a name that has stood for sturdy, dependable yarn beams in the Textile Industry for over 20 years . . .

MILTON MACHINE

offers you A RELIABLE SOURCE OF

RUGGED STEEL HEAVY DUTY PROCESSING REELS



HEAVY DUTY REEL

Shown at left is one of several wire rope or cable reels designed and manufactured over the past several years to meet the heavy duty service of a wire rope manufacturer. Flanges with rope brake rim grooves are heavily ribbed semi-steel castings.

WELDED STEEL REEL

At left is one of several welded reels made to wire rope manufacturers' specifications for replacement of light weight pressed steel reels which failed to hold up under heavy duty service.

SOLID STEEL PROCESSING SPOOLS & BOBBINS

Another of our products for the unusual service applications of the wire industry.

INQUIRIES INVITED . . . Send us a sketch or print stating the limiting dimensions and services required—or write or phone. Our field engineer-representative will be glad to describe our facilities for supplying you with special heavy duty processing reels, spools or bobbins.

let's get acquainted..

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DESIGNERS — ENGINEERS — MANUFACTURERS
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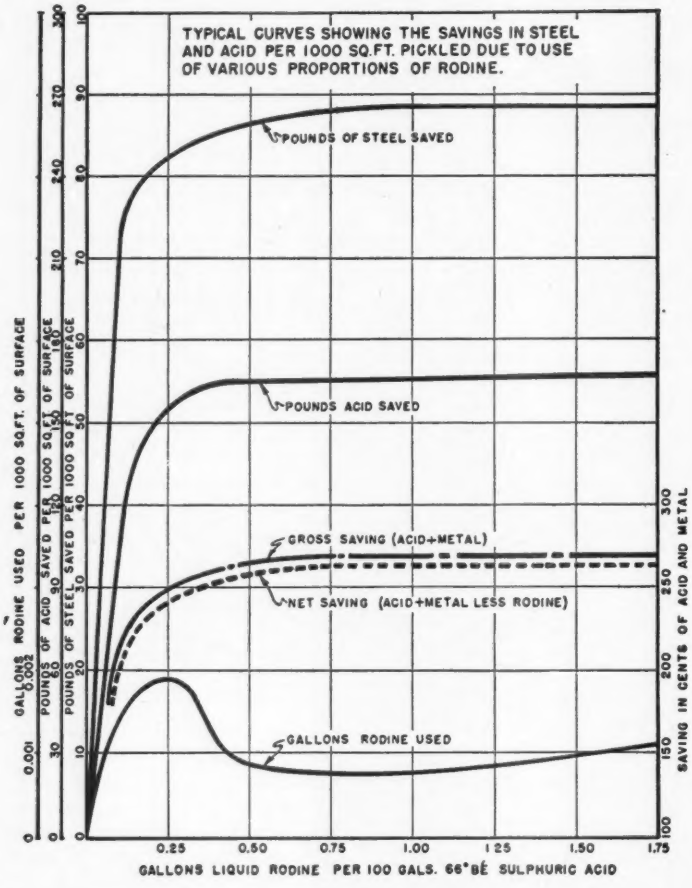
Technical Service Data Sheet

Subject: EFFICIENT PICKLING WITH "RODINE"®

A. SAVINGS POSSIBLE WITH "RODINE"


TYPICAL CURVES SHOWING THE SAVINGS IN STEEL AND ACID PER 1000 SQ.FT. PICKLED DUE TO USE OF VARIOUS PROPORTIONS OF RODINE.
POUNDS OF STEEL SAVED
POUNDS ACID SAVED
GROSS SAVING (ACID+METAL)
NET SAVING (ACID+METAL LESS RODINE)
GALLONS RODINE USED
GALLONS RODINE USED PER 1000 SQ.FT. OF SURFACE
POUNDS OF ACID SAVED PER 1000 SQ.FT. OF SURFACE
POUNDS OF STEEL SAVED PER 1000 SQ.FT. OF SURFACE
SAVING IN CENTS OF ACID AND METAL
GALLONS LIQUID RODINE PER 100 GALS. 66°BÉ SULPHURIC ACID

B. TYPICAL APPLICATION OF "RODINE"

Pickling shell cases in uninhibited muriatic or sulfuric acid contributes to their embrittlement and makes it difficult to draw them without breakage. By adding a small amount of "Rodine" to the pickle bath, embrittlement is suppressed and more than enough acid is saved to pay the costs of the inhibitor.

CHEMICALS ACP PROCESSES WRITE FOR DESCRIPTIVE FOLDER ON "RODINE" AND INFORMATION ON YOUR OWN PICKLING PROBLEM. CHEMICALS ACP PROCESSES

Limitations, and Present Status of the Process. Especially valuable is extensive bibliography which lists not only literature references, but U. S. and German patents and available reports on German shell-mold casting technology prepared by Allied intelligence teams visiting that country at the end of World War II.

★ ★ ★

Pb 106 640, "Current Status of the Shell-Mold or "C" Process of Precision Casting Metals," 13 pages, sells for $.25 a copy. Order from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Orders should be accompanied by check or money order payable to the Treasurer of the U. S.

The Importance of Scrap

The tonnage of copper recovered from scrap in 1951 amounted to more than the tonnage of new copper mined in this country.

★ ★ ★

The percentage of lead from scrap ran even higher than copper. It was 20% more last year than the domestically mined lead ore.

★ ★ ★

About one-third of our aluminum supply comes from scrap, as well as one-third of our zinc and a third of our tin.

★ ★ ★

Many metals are going to be in short supply for a long time. To locate scrap-ferrous and non-ferrous is not only a matter of wisdom, but one of absolute necessity, if you, the user of metal, are to be assured of a continuing supply.

★ ★ ★

Of course, there are a large number of concerns who are cooperating whole heartedly so far as industry scrap is concerned. How about scrap in the homes of your employees? Urge them to look around and bring it in. It will help tremendously.

★ ★ ★

The Non-Ferrous Scrap Mobilization Council, the Institute of Scrap Iron and Steel, and the National Association of Waste Materials Dealers all stand ready to help you, if advice on any point is needed.

House Member Asks for Release of Stockpile Copper

On May 1st **Rep. James T. Patterson** of Connecticut asked the support of the House for his suggestion that the Munitions Board release 10,000 tons of copper a month for three months from the national stockpile. Since last week, he told the House, 155 persons have become temporarily unemployed in the brass industries of Connecticut as a result of the copper shortage. Mr. Patterson said that it is to the national interest for each member of Congress to soberly consider the needs of the Connecticut brass and copper workers.

New Aluminum-Plating Process

A practical process for electrodepositing aluminum at room temperature has recently been developed by **D. E. Couch** and **Abner Brenner** of the **National Bureau of Standards.** Dense, ductile deposits of the metal are being obtained at the Bureau from a new type of organic plating bath[1] consisting of an ether solution of aluminum chloride and a metal hydride. The new bath is expected to find important application for electroforming articles with close inside tolerances, such as waveguides, and for providing various types of equipment with a thin protective coating of aluminum.

★ ★ ★

Because aluminum is so far above hydrogen in the electromotive series of the elements, it has never been deposited from aqueous solutions, which always contain some hydrogen in ionized form. Aluminum is usually produced commercially from a bath of fused cryolite and aluminum oxide. However, this process must be carried out at a high temperature, and the metal is obtained in a fused state, unsuitable for electroplating or electroforming. Electrodeposition from nonaqueous solutions has been tried in the past, with some success, but the procedure was too difficult for practical applications, and the deposits were lacking in purity, ductility, and other desirable qualities.

★ ★ ★

The aluminum plating bath is pre-

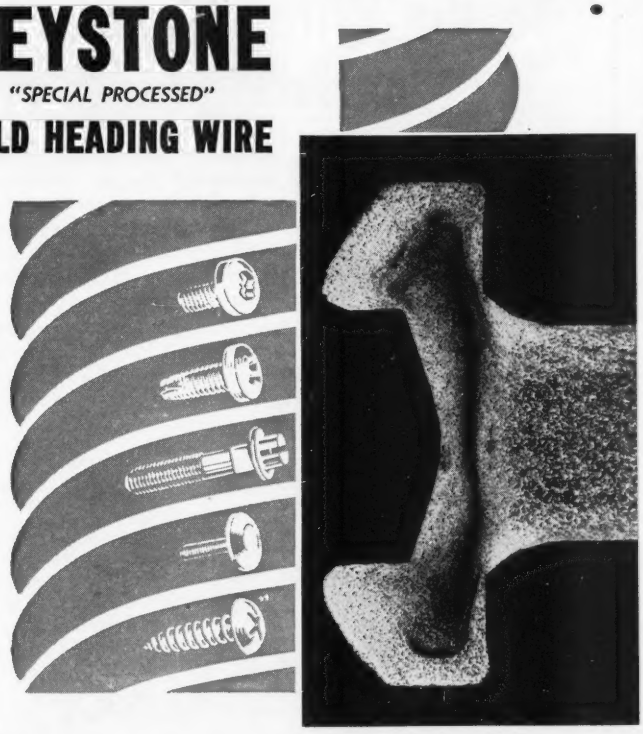
[1] **For further details, see "A hydride Bath for the Electrodeposition of Aluminum," by Dwight E. Couch and Abner Brenner, J. Electrochem, Soc. *99*, 234 (June 1952).**

Flows without a flaw...

KEYSTONE

"SPECIAL PROCESSED"

COLD HEADING WIRE



The drastic displacement of metal during the cold heading of recessed clutch head screws requires special wire that will flow with unbroken fibres. The above macrograph clearly indicates long, unbroken flow lines in a clutch pan-head screw made from Keystone "Special Processed" Cold Heading Wire.

Carefully selected ingredients—our own exclusive drawing and heat treating process—rigid quality controls and inspections—give Keystone "Special Processed" Wire unsurpassed performance in unusually difficult cold heading problems.

INDUSTRIAL WIRE SPECIALISTS

Keystone Steel & Wire Company

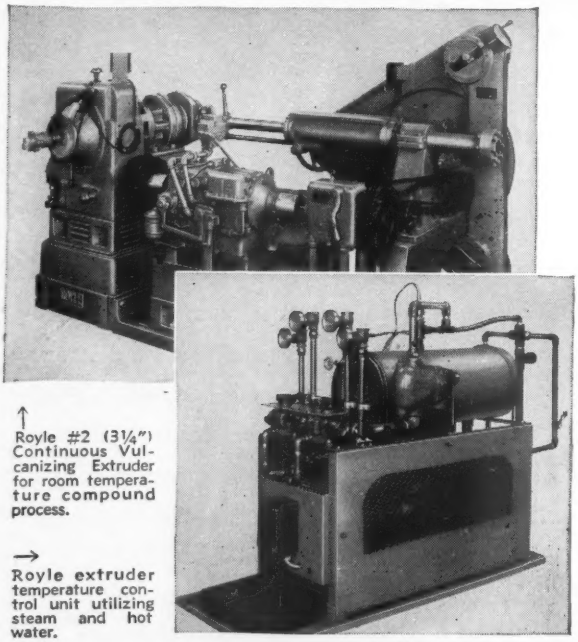
PEORIA 7, ILLINOIS

Of Particular Importance

To the Wire Insulating Industry

The room temperature compound process and associated equipment recently developed by the Western Electric Company, Incorporated, offer nine important advantages. These advantages begin with the storage of completely mixed, ready-to-extrude, rubber, GR-S, or Neoprene compounds and extend to a smoother and improved appearance for the finished product.

The complete extruder vulcanizing portion of the room temperature compound process is available to insulated wire producers* from John Royle and Sons who, for seventy-two years, have been building extruding machines to meet the most exacting process requirements.



↑ Royle #2 (3¼") Continuous Vulcanizing Extruder for room temperature compound process.

→ Royle extruder temperature control unit utilizing steam and hot water.

CHECK THESE ADVANTAGES:

- Improved diameter control
- Reduction in compound scrap
- Reduction in electrical faults
- Permits storage of completely mixed compounds
- Permits more economical scheduling of mixing equipment
- Eliminates "warm-up" operation
- Possible mill-room economies
- "Hot" machines may be converted
- Finished product has smoother finish—better appearance

Licensees of Western Electric Company

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pared at NBS by adding either lithium hydride or lithium aluminum hydride to an ethyl ether solution of anhydrous aluminum chloride. For best results, the ether should be anhydrous and alcohol-free. The concentration of the aluminum chloride is not critical and may vary from 1 to 4 molar. Current densities may be as high as 4 or 5 amperes per square decimeter. However, if thick deposits are desired, the current density should not be greater than 2 amp/dm^2. Because of the high concentration of aluminum chloride in the ether, the bath is not as flammable as would normally be expected.

★ ★ ★

To prevent the entrance of moisture, the bath is prepared and used in a closed container consisting of a glass plating vessel with a tightly fixed polyethylene lid. Anodes of aluminum rod pass through the lid, and the objects to be plated (cathodes) are introduced and removed through a central hole which is ordinarily kept closed with a rubber stopper. If hermetically sealed, the bath will keep for several weeks; however, under ordinary operating conditions the solution slowly deteriorates and eventually gives streaked and brittle deposits.

★ ★ ★

No agitation of the bath is necessary. In fact, a quiescent bath is actually an advantage as the sediment from the anodes settles to the bottom of the vessel, making bagging of the anodes and filtration of the solution unnecessary. The composition of the bath is easily controlled since the only constituent that changes appreciably in concentration during the plating process is the lithium hydride. Occasional additions of lithium hydride increase the life of the bath, but in time the lithium hydride becomes insoluble and the bath can no longer be used.

★ ★ ★

When sufficient lithium hydride is used, the deposits are white, mat and quite ductile; but if the lithium hydride content is too low (less than 3 or 4 g/1), the deposits become hard, brittle, and grey. Still further reduction of the hydride content produces deposits that are dark and stressed and that often crack or peel from the cathode. Ordinarily

deposits 0.01 inch or more thick are are visibly crystalline, but this effect can be reduced somewhat by adding a small amount of B,B'-dichloroethyl ether. Pitting, which frequently occurs in aqueous baths, is practically nonexistent in the ether bath.

★ ★ ★

Cathode and anode efficiencies for the process are approximately 100 percent. Deposits 0.05 inch thick have been prepared at the Bureau, and thicker deposits should be possible if the sharp edges of the cathode are shielded to prevent treeing.

★ ★ ★

The National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C., will be glad to respond to inquiries from our readers who may be interested in investigating the process further.

Industrial Utilization of Aluminum

A guidebook to the better utilization of aluminum is now available to U. S. industry, the **Office of Technical Services of the Department of Commerce** announced recently.

★ ★ ★

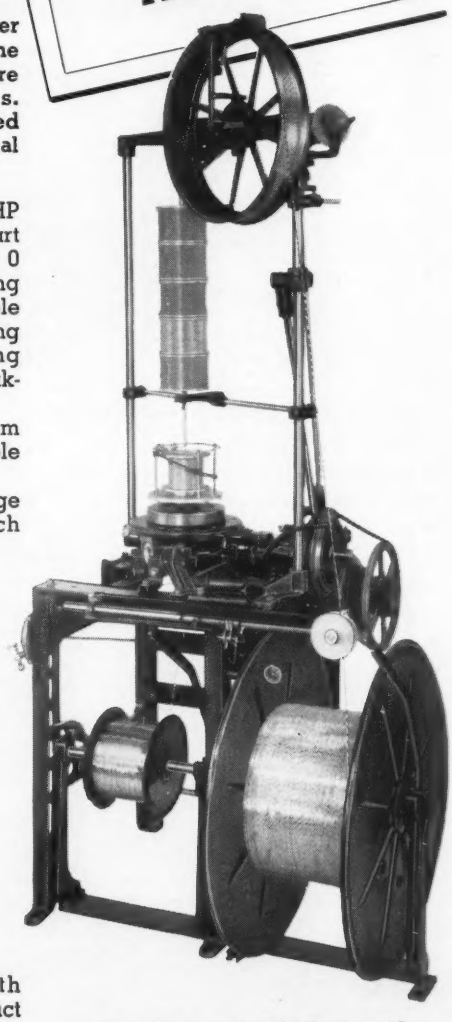
Entitled "The Aluminum Symposium," the book contains the complete record of the technical papers delivered at a symposium on aluminum held at the Army's Engineer Research and Development Laboratories, Fort Belvoir, on 30 March 1951. This symposium, one of a series on "Materials and Design for Lightweight Construction," was sponsored with the cooperation of the three major industrial aluminum producing concerns (Aluminum Co. of America, Reynolds Metals, and Kaiser Aluminum and Chemical Corp.).

★ ★ ★

The book, covers the following subjects: "Development and Present Status of the Aluminum Industry," "Properties and Specifications of Aluminum Alloys," "Forming Aluminum," "Efficient Machining of Aluminum Alloys," "Joining the Aluminum Alloys," "Corrosion Characteristics of Aluminum and Fundamental Considerations of Protective Coatings," "Design for Aluminum Castings and Forgings," "Design in Aluminum Extrusions," "Fabricated Aluminum Alloy Structures," "Designing with Aluminum," "Cost and Stress Considerations in

A NEW VERSATILE SERVER

WARDWELLIAN P-C SERVING MACHINE



For applying small diameter filaments such as polyethylene and materials of a similar nature on electrical conductors. Machine is especially adapted for the production of coaxial wires.

- Machine driven by a ½ HP Graham Transmission to start at head speeds ranging from 0 to 2000 RPM. Permits starting operation at any speed suitable for type of material being served, thereby eliminating stretching and avoiding breaking material.
- Manual control for Graham Transmission readily accessible at front of machine.
- Standard set of five change gears furnished with each machine.
- Machine equipped with electric stop-motion.
- Production dependent upon requirements: 4912 feet per hour for applying material at ½" lay.
- Supply tube holds five spools.
- Supply spools made in halves to permit removal without cutting wire.
- Seven supply spools furnished with machine.
- Capstan 18" diameter, 3" face.
- Opening through serving head, 3/16" diameter.
- Machine equipped with counter for measuring product in feet.
- Stand will accommodate reel 30" in diameter with 13" overall width.
- Special windup parts required for reels with drums under 8" in diameter.
- Reels not included with machine.
- Weight approximately 664 lbs.
- Weight crated for domestic shipment approximately 764 lbs.

WARDWELL BRAIDING MACHINE CO.

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Representatives for Europe, British Colonies and Dependencies

JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

Cover non-metallic sheathed cable, building wire and weatherproof wire

1800 feet an hour

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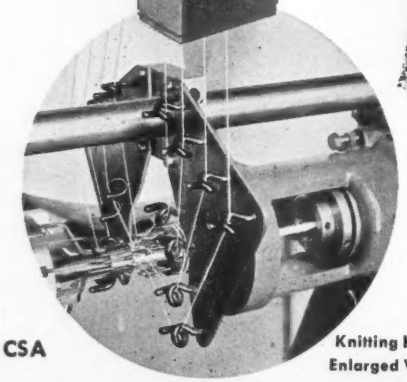
***Fidelity* SINFRA**

KNITTERS

Model C-3H Knitter & Haul-Off Reel Stand

- ★ Increase speed 10-15 times
- ★ Save on cost of yarn
- ★ Boost labor output 600%
- ★ Eliminate yarn rewinding
- ★ Conserve floor space
- ★ Cut maintenance costs
- ★ Reduce power requirements
- ★ Minimize operating noise
- ★ Improve working conditions
- ★ Provides automatic control
- ★ Lower your capital investment
- ★ Approved by UL, ASA, AAR, CSA



Knitting Head Enlarged View

This *Fidelity Sinfra* Wire Covering Machine offers you high production speed and low operating cost. The output of *one* Knitter equals 15 conventional machines. Savings in yarn costs and direct labor alone pay for this new equipment in 12 to 24 months. Knit products are universally used and meet all standards.

The modern Fidelity Sinfra method uses fewer yarns and large 3 pound cones located on a stationary creel. High-speed, rotating Knitting Heads cover the wire at 30 or more feet per minute. Design permits horizontal operation at convenient working level with no crawling or stretching. Automatic electric stop motions and other advanced features cut maintenance and down time.

To see why top companies choose Fidelity, read our literature proving its advantages. Write today for Catalog W.

Manufacturers of intricate precision machinery since 1911

FIDELITY MACHINE COMPANY INC.

3908 FRANKFORD AVE. • PHILADELPHIA 24, PA.

Aluminum Structural Design."

★ ★ ★

Although aluminum itself does not form good castings, its alloys do have excellent casting properties. A number of these alloys and their properties as a structural material are given in the paper on "Properties and Specifications of Aluminum Alloys."

★ ★ ★

The various techniques for forming aluminum—cold forming, roll forming, and stretching—are generally discussed in the paper on "Forming Aluminum" and the detailed data for each of these techniques are given in a related appendix.

★ ★ ★

The discussion on "Efficient Machining of Aluminum Alloys" gives detailed recommendations to be followed for best results in machining aluminum. Welding, brazing, soldering, resin bonding, cold welding and riveting are reviewed in the paper on "Joining the Aluminum Alloys." The paper on "Corrosion Characteristics" explains the physical phenomena underlying corrosion of aluminum and the measures used to protect against it. The paper on "Design for Aluminum Castings and Forgings" discusses at length: Proper Choice of Manufacturing Process; Alloy and Heat Treatment to be Used; Dimensional Details of the Design; Fatigue; Creep; and Impact.

★ ★ ★

Especially valuable is the extensively illustrated paper on "Design in Aluminum Extrusions" which presents principles on Extrusion Press and Die, Manufacturing Limits, Types of Extrusions, Cost Factors, Extrusion Design and Extrusion Applications. The papers on "Fabricated Aluminum Alloy Structures" and "Designing with Aluminum" are full of specific, illustrated examples.

★ ★ ★

Pb 106 333, "Aluminum Symposium 30 March 1951" 142 pages including photos, drawings, graphs and tables sells for $3.00 a copy. Orders should be addressed to the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. accompanied by check or money order payable to the Treasurer of the United States.

Outstanding Personalities of the Wire Industry

Charles J. Royle Retires from Hudson Wire

The Hudson Wire Company, Ossining, New York, manufacturers of non-ferrous wires for the electronic and electric wire and cable industries, have announced the retirement of **Charles J. Royle** as Executive Vice President and General Manager.

★ ★ ★

His place has been taken by **Oakley F. Hoyt**, whose appointment as General Manager was simultaneously announced.

H. J. Blaser to Head Seneca Wire

Seneca Wire & Mfg. Company, Fostoria, Ohio has elected **Herman J. Blaser** President and General Manager, **H. L. Martin**, Vice President, **F. A. Bormuth** Secretary, and **L. J. Schreiner**, Treasurer and Purchasing Agent. These changes have come about as a result of the death of the late President, **Lucian E. Kinn.**

★ ★ ★

Mr. Blaser has been Vice President since 1938 and has been directly associated with Mr. Kinn in this and various other enterprises since 1919.

H. J. Blaser, President and General Manager of Seneca Wire & Mfg. Co.

★ ★ ★

He has also been advanced from Vice President to President and General Manager of Keystone Wire Cloth Company, Hanover, Pa., and Standard Wire Cloth & Screen Company, York, Pa., respectively.

J. T. Duffy, Jr., Resigns As Riverside President

It is reported that **James T. Duffy, Jr.**, has resigned as president of the **Riverside Metal Company** and that **Victor Ritschard**, senior vice president, will serve as acting president. During recent months, Mr. Duffy made a number of significant statements concerning government policy of metal substitution, NPA operations and conflicting views by different factors on the copper situation.

★ ★ ★

He said recently, that there is a growing disposition on the part of

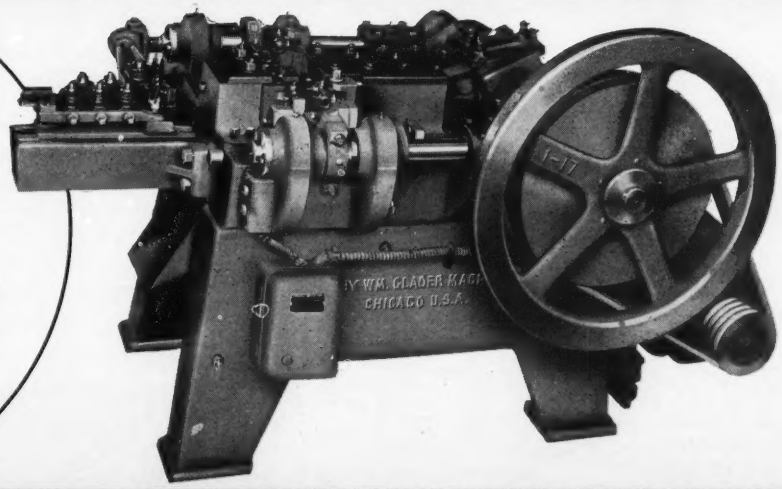
GLADER

HIGH SPEED WIRE NAIL MACHINES

HIGH TONNAGE OUTPUT—LOW MAINTENANCE COST

You can take care of increased production schedules and better product demands with these machines of established reputation.

For 55 years GLADER MACHINES have been giving HIGH QUALITY, LOW COST nail production.



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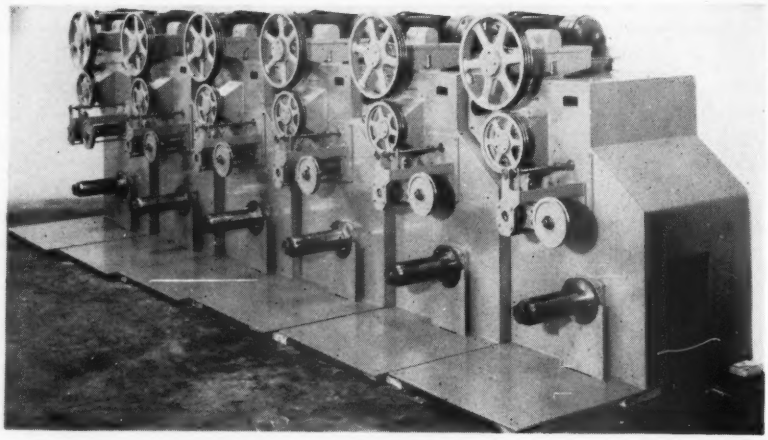
Export Dept.: 122 E. 42nd STREET, NEW YORK 17, N. Y.



MULTIPLE WIRE TAKE-UP NO. 1049

An assembly of 6 individual units, each reel-arbor torque motor driven. For use in wire tinning outfits, etc.

Constant wire speed by motor driven capstans.
Each traverse adjustable for width and pitch.
Reels held on expanding arbors.
Welded steel construction.
Ball-bearing mounted throughout.
Capacity — 28 inch reels

Many other models, including single unit and multiple units, horizontal, vertical, or inclined.
Let-offs with adjustable torque motor or friction tensions.
Spinner let-offs with wire tension adjustable while in operation.

WIRE DRAWING, ENAMELING, TINNING, INSULATING, TAPING, GLASS-COVERING, PANNING, AND ALLIED MACHINERY.

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"American" INSULATING MACHINERY COMPANY

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FAIRHILL AND HUNTINGDON STREETS

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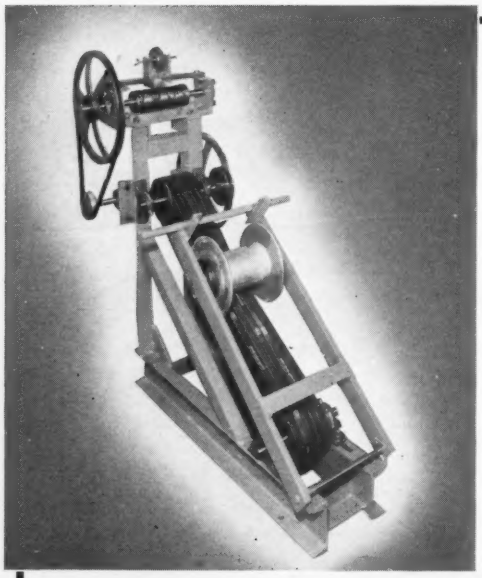

NEW WIRE TAKE-UP

Engineered and built by wire men for wire mills. The Take-Up shown is designed for use primarily with wire drawing and rolling equipment. New in principle; better in operation. Traverse is syncronized so that a good wire lay is obtained. Rugged construction, compact, ball bearings throughout and LOW IN COST. Designed by specialists in loading and unloading reels. All sizes.

One customer who has used this new Take-Up for over 4 months reports that he gets better winding and spooling with this FEDERAL TAKE-UP than from any other machine he has used.

Write today for details on these fine new FEDERAL TAKE-UPS.

FEDERAL EQUIPMENT

- CAPSTANS
- PAY-OFFS
- TAKE-UPS— SINGLE & DOUBLE
- ELECTRODES
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Federal Manufacturing Co.

SPECIAL WIRE MACHINERY

236-240 Hall Avenue, Wallingford, Conn.

many to reexamine the whole question of substituting aluminum for copper base alloys "where it isn't absolutely necessary," as copper's properties are essential in many applications, the efficiency of which would be seriously impaired if any other material were used. He has several times indicated his belief that the copper supply picture would improve in the near future, a belief shared by others.

William W. Scott

William Wallace Scott, Jr., vice president in charge of sales, and a director of **Laclede Steel Company** died on April 15th. Mr. Scott was born in Pittsburgh, June 4, 1880.

★ ★ ★

Mr. Scott had been with the Laclede Steel Company for 30 years and was elected vice president and director of the compaiy in 1923. He was also a director of the Southern States Steel Corporation, Dallas and Beaumont, Texas. His entire life was spent in the steel industry. He went to work in the steel mills at the age of 18 and was with the old Carnegie Steel Company in Pittsburgh. He was in the purchasing department and operating department at the Edgar Thomson Works in Pittsburgh, and went from the operating department to the sales department where he served in the Baltimore and Philadelphia sales offices of the company. He came to St. Louis in 1937 as assistant manager of sales of the Carnegie-Illinois Steel Companies and became district sales manager of these companies in 1919. He was employed by the Laclede Steel Company as general manager of sales and one year later was elected vice president in charge of sales and director of the company.

Michigan Oven Appoints Representatives

H. O. Bennett, Anderson, Ind., has been appointed by **Michigan Oven Company,** Detroit, Mich. as its representative in the Indianapolis area and portions of Ohio and Kentucky. A graduate of Purdue University, Mr. Bennett was for 5 years process engineer at the General Motors plant in Muncie, Ind., and for 14 years was an industrial representative for the Surface Combustion Corporation.

★ ★ ★

The Company, has also named **Bruce Hogarth,** St. Davids, Pennsylvania, as its representative for the Philadelphia area. Since graduating from Duke University, College of Engineering, Mr. Hogarth has been associated for the past 8 years with the W. Wirt Young and Assoc. as a sales engineer representing Gehnrich and Gehnrich Inc., Surface Combustion Corp., and Webster Engineering Company, Division Surface Combustion Corporation.

★ ★ ★

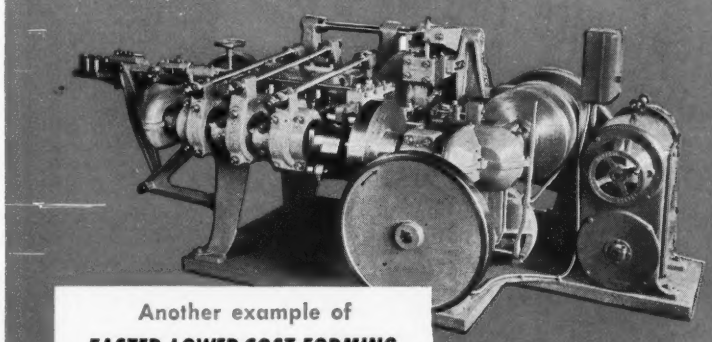
Laclede Elects Wilke Officer and Director

The board of directors of the **Laclede Steel Company** recently elected **J. M. Wilke,** vice president and a director of the company. Mr. Wilke fills the vacancy on the board created by the death of **W. W. Scott, Jr.,** on April 15, 1952. He also succeeds Mr. Scott as vice president in charge of sales.

★ ★ ★

Mr. Wilke was employed by the company in 1916 and virtually his entire career with the company has

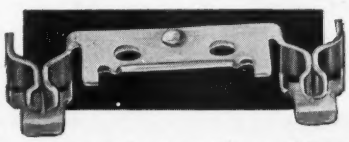
PRODUCTION RECORDS *Broken*
with NILSON 4-SLIDE *Machine!*



Another example of
FASTER, LOWER COST FORMING
of Ribbon Metal Stock

180 Terminal Contacts Per Minute

7 Separate Operations Eliminated



A famous national manufacturer tripled production of the Terminal Contact illustrated above (in actual size) and reduced production costs proportionately by replacing several progress die set-ups with one Nilson S-3-F four side machine. *Seven separate operations were eliminated;* 180 completed contacts produced per minute. Time required for tooling changes was reduced 50% over similar type machines.

This example clearly shows the big savings you can make in overhead, maintenance, labor and time with a Nilson 4-slide!

Taking stock directly from the coil, NILSON metal ribbon stock four-slide machines automatically feed, straighten, pierce, blank, swage, stamp, coin, cut off and perform up to five forming operations with speed and accuracy. Built in five models with capacities up to 2½" wide and feed lengths up to 15". For specific recommendations on your wire and ribbon metal forming problems, send details, prints or samples of your operation to us when you request the bulletin.

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Specialists in Wire Forming Equipment for Over 50 Years

THE A. H. NILSON MACHINE COMPANY

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OTHER NILSON PRODUCTS:

- Automatic chain-making machines
- Automatic staple forming machines
- Wire and Stock reels
- Foot Presses
- Wire straightening equipment
- Slide Feeds for Presses

been in the sales department. He was appointed district manager of sales, Detroit, Michigan, in 1925 and remained there through 1945. He then returned to the general office of the company in St. Louis as manager of sales, merchant products. In January, 1950, he was appointed general manager of sales which was the position he held at the time of his election as vice president of the company.

★ ★ ★

He will be succeeded as general manager of sales by **Harold R. Kilpatrick**, who was employed in the sales department of the company in 1928 shortly after graduation from the Rolla School of Mines. Since then he has been in merchant products sales; first as salesman, then as district sales manager, St. Louis, and finally manager of sales, merchant products, the position he held prior to his appointment as general manager of sales.

Bethlehem Has New Chief Engineer at Johnstown

George H. Greene has been appointed chief engineer of the Johnstown, Pa., plant of the Bethlehem Steel Co., Bethlehem.

Alcoa Elects Three New Officers

Three executives of **Aluminum Company of America** have been elected to newly created vice presidencies, the company has announced.

★ ★ ★

Gordon W. Cameron, ALCOA's treasurer since 1943, becomes vice president and treasurer; **Arthur P. Hall,** director of public relations and advertising, becomes vice president in charge of those fields; and **C. F. Nagel, Jr.,** chief metallurgist, assumes the third new vice presidential post. He is also chairman of the Technical Committee and of the Research Policy Committee.

Changes in Naugatuck Chemical's Development Department

Six organizational changes in the development department of **Naugatuck Chemical Division, United States Rubber Company,** were announced recently by **M. G. Shepard,** general development manager, as follows:

Dr. Vadim C. Neklutin, assistant manager of process development.

Robert M. Greene, group leader of Paracril and synthetic latex development in the process development section.

Robert L. Knapp, group leader of Vibrin and Kralac development in the process development section.

Dr. William F. Brucksch, Jr., senior group leader for physical chemical research.

E. Leonard Borg, senior group leader for applied and developmental research in synthetic rubber.

John A. Flickinger, group leader for dispersions and Sealz development.

Honeywell Names New Regional Sales Head

John A. Robinson has been named sales manager of the Eastern and Mid-Atlantic regions for the Industrial Division of **Minneapolis-Honeywell Regulator Company,** it was recently announced by **W. H. Steinkamp,** general sales manager.

★ ★ ★

At the same time Steinkamp announced the appointment of **Joseph J. Matulis** as industrial manager for the Midwest region to succeed Mr. Robinson and the promotion of **C. G. Behnke** to industrial manager of the Chicago branch office.

★ ★ ★

Mr. Robinson succeeds **O. B. Wilson,** recently named field sales manager, Steinkamp said.

anneal wire the MODERN way!

You'll save money, you'll improve efficiency along many lines with the unique Ajax Electric Salt Bath wire annealing method. It requires less floor space, less labor, less maintenance. Heating cycles average less than 20 minutes, even on difficult jobs. There is no scaling, no decarburization, no explosion hazard, none of the bothersome problems entailed with atmosphere equipment. Salt bath treating does the work faster, better, cheaper!

Ideal for annealing low- or high-carbon and stainless steel wire and rod; annealing aluminum, and copper and silver alloys; and for descaling stainless and alloy steel wire in molten salt baths.

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Frankford and Delaware Aves. • Phila. 23, Pa.
The World's Largest Manufacturer of Electric Heat Treating Furnaces Exclusively

WRITE FOR YOUR COPY!
This 72-page Ajax booklet tells the entire story of salt bath heat treatment as applied throughout modern industry. Ask for Booklet **116A.**

AJAX HULTGREN ELECTRIC SALT BATH FURNACE

Named Manager of Industrial Ovens' New Research and Development Laboratory

The appointment of **Merle F. Schreurs** as Manager of the new coating Research and Development Laboratory at **Industrial Ovens, Inc.**, Cleveland, Ohio, has been announced by **C. A. Litzler,** IOI's president. Mr. Schreurs was formerly Project Engineer for the Vinyl Dispersions Division of the Research and Development Laboratory of Texileather, Toledo, Ohio.

★ ★ ★

Merle F. Schreurs, Mgr. Coating Research and Development Labs., of Industrial Ovens, Inc., Cleveland, Ohio.

Industrial Ovens, Inc. designs, manufactures and installs continuous materials handling and processing systems—generally involving the engineered application of heat—for the rubber, plastics, paper, textile, film and wire industries.

★ ★ ★

During the last ten years Mr. Schreurs has had extensive experience in formulation and fabrication-processing of rubber, tire fabrics and mechanical rubber goods. He has also done extensive research in low pressure laminates and the injection moulding and extrusion of thermo-set and thermoplastic materials. This work also includes research in the field of coating with plastisols, organosols, hydrosols, silicones and rubber latices.

★ ★ ★

He was graduated with a degree in chemical engineering from Iowa State College, where he specialized in chemical formulization of plastics.

Carboloy Adds to Training School Staff

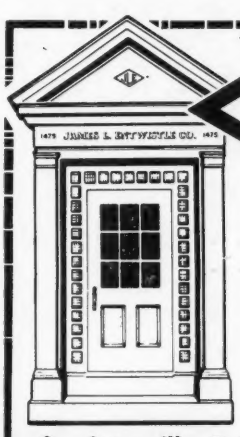
Edgar A. Reed has joined the staff of the Customer Training School of **Carboloy Department of General Electric Company,** Detroit 32, Michigan. In addition to his duties as Die Instructor in the training school, Mr. Reed will handle die service on a national basis.

★ ★ ★

He has had 17 years experience in the carbide die field—the latter ten in supervisory capacities in both manufacturing and sales work. He has been associated with the McCallum Die Company and Hartley Tool and Die Company, both of Thomaston, Connecticut.

Firth Sterling Shortens Name

At the Annual Meeting of the Shareholders on Tuesday, April 29, 1952, the name of **Firth Sterling Steel & Carbide Corp.** was changed to **Firth Sterling, Inc.** This was done, **K. D. Mann,** President, stated, because the nature of Firth Sterling's business had broadened to such an extent that the former name was no longer descriptive of the range of products now being produced by the Company, including high temperature alloys, heavy metal for shielding gamma rays of atomic energy and other items which are of a classified nature.



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SERVING THE WIRE INDUSTRY THROUGHOUT THE WORLD

- Caterpillar Pull-outs
- Standard Sets of Spark-Testing Equipment
- Take-ups and Re-spoolers
- Reelers
- Coilers
- Spoolers
- Collapsible Coiling Reels
- Wire Sparkers and Accessories
- Hand Locators
- Electrode Units and Stands
- Measuring Machines, Counters and Accessories
- Wire Guide Units
- Pay-off Reels Stands
- Electronic Devices
- Shaftless Take-ups and Payoffs
- Wire Pre-Heater
- Disk Brakes and Controls, Drag Units and Slip Clutches
- Wire Marking Machines, Type Strips, Inks
- Labelling Machines
- Pneumatic Equipment and Controls
- Special Machinery for the Wire Industry
- Hydraulic Equipment and Controls
- Hi-Pot Test Sets
- Cable Handling Equipment for Warehouse Use

SEE PAGE 458 for news of the JLE Cable Cutter for Cutting Stranded Steel Cable.

JAMES L. ENTWISTLE CO.

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Northwestern Sales Appointments

George W. Bulmer and **Robert J. Kay** were recently appointed, respectively, manager of sales, and assistant manager of sales, merchant trade products, of the **Northwestern Steel & Wire Co.**, Sterling, Ill.

★ ★ ★

To Manage Westinghouse Columbus Office

Marshall N. Austin has been appointed manager of the Columbus, Ohio, sales office for the **Westinghouse Electric Corp.**, Pittsburgh.

John F. Allen Managing New Extrusion Machinery Division of Industrial Ovens, Inc.

Appointment of **John F. Allen** as Manager of the Allen Extrusion Machinery Division of **Industrial Ovens, Inc.** was made April 5, 1952, by **C. A. Litzler**, IOI president. Mr. Allen heads a complete new plastic and rubber insulation machine subdivision of the company.

★ ★ ★

Industrial Ovens, Inc., 13825 Trisket Road, Cleveland 11, Ohio designs, manufactures and installs continuous materials handling and processing systems — generally requiring the engineered application of heat—for the rubber, plastics, paper, textile, film and wire industries.

★ ★ ★

J. F. Allen, Mgr. Extrusion Machinery Div., Industrial Ovens, Inc., Cleveland, Ohio.

M. Allen has had thirty years of extensive design and engineering sales experience in the rubber and plastics extrusion field. In 1916, Allen joined his father, Edward E. Allen, originator of the Rapido-Tuber, as a part-time development and design engineer. When that company merged with National Erie in 1928, Allen assumed the position of Sales Engineer of original installations. His association with National Erie continued up to the time of appointment at Industrial Owens.

★ ★ ★

Engineering Staff Expanded By The Standard Machinery Co.

Two important new additions to the engineering staff have just been announced by **The Standard Machinery Company**, Mystic, Connecticut, manufacturers of plastic molding presses and extruding machines for the wire and cable, rubber and plastic industries. These are **Nathaniel Little** and **Earl King**, design engineers.

★ ★ ★

"**These** additions bring our engineering staff to a total of eleven highly trained specialists and are part of a broad expansion program," says **Norton C. Wheeler**, Standard Machinery president, in making the announcement. "The expansion is due largely to the widespread ac-

NRM

"JOB-DESIGNED" WIRE COVERING EQUIPMENT . . .

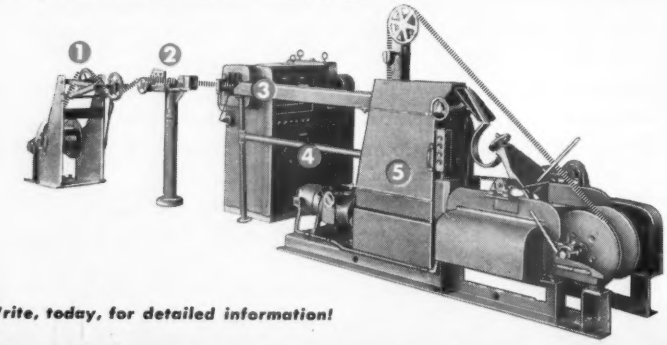
When it comes to covering wire with plastics, you can't beat NRM extruders and their tailormade accessories. For NRM equipment is specifically designed to do an exact job of insulation with any of the wire covering plastics — including Nylon.

Pictured here is the equipment designed to cover wire with vinyls, or polyethylene. With a few simple changes, this same basic machinery can be used with Nylon.

Important features of NRM equipment include rugged electrically heated extruders with built-in "Balanced Heat Control" for exact temperature control; precision-built, alloy steel feed screws with flame hardened flight surfaces designed to eliminate "pulsation"; unique die and front flange assembly for faster die and screen changes and easier "change-overs"; and, supply reels, wire straighteners, wire preheaters, and cooling and take-up units engineered to give a fast, continuous production at close tolerances.

Important, too, are the quality workmanship and years of experience that go into all NRM equipment.

1. Supply Reel Stand
2. Wire Straightener
3. 1½" Electrically Heated Plastics Extruder
4. Cooling Trough
5. Combination Take-Up and Cooling Unit



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2040

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General Offices & Engineering Laboratories: Akron 8, Ohio
East: 1180 Raymond Blvd., Newark, N. J.
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Export: Omni Products Corp., 460 Fourth Ave., New York 16, N. Y.

Creative Engineering

ceptance of Davis-Standard extruders and to this company's determination to continue to anticipate the rapidly changing and expanding requirements of the rubber, plastic and electrical insulated wire and cable industries."

★ ★ ★

Nathaniel Little, a graduate of the University of Montana, assumes his new position from an engineering affiliation with General Dynamics Corporation. In addition to his engineering background, Mr. Little has studied fine arts at a number of outstanding schools in this country and in France.

★ ★ ★

Earl King joins The Standard Machinery Company from the Turbine Generator Division of the General Electric Company at Schenectady. A World War II veteran, his basic engineering training was acquired at the New York State School at Troy, New York.

Metallurgist Joins DuPont

Alexander L. Field, Jr., formerly metallurgist with the **Bethlehem Steel Co.** at Sparrows Point, Md., is now employed in a similar capacity by **E. I. duPont de Nemours & Co., Inc.,** in the pigment department, Newport, Del.

Joseph H. Hyde

Joseph H. Hyde, 50, of 41 Broadview Street, vice president and general superintendent of the **Bristol Brass Corporation,** died on May 3rd in the Bristol Hospital following a short illness.

★ ★ ★

Mr. Hyde was born in Derby, Conn., September 2, 1901. He was a graduate of Yale Sheffield Scientific School, Class of 1922 and in 1925 entered the employ of the American Brass Company Ansonia branch. He came to Bristol in 1941 to assume the duties of plant superintendent at the Bristol Brass Corporation and in 1949 he was elevated to the vice presidency of the company still maintaining his former position.

Corson Goes to Carpenter

John H. Corson, formerly engineer with the **Bethlehem Steel Co.** at their Williamsport plant, is now a metallurgist with **Carpenter Steel Co.,** Reading, Pa. Prior to that he was with the **John A. Roebling's Sons Co.**

Appoints New Purchasing Agent

Bertil G. Erickson has been named purchasing agent of **Signode Steel Strapping Company.** He will be succeeded as assistant purchasing agent by **Ernest Blomquist,** a company announcement said.

Made Works Manager of Eastern Brass

Richard Willstatter, formerly with the **Chase Brass & Copper Co.** of Waterbury, Conn., has been appointed assistant works manager of the **Eastern Brass & Copper Co.,** New York City.

P. G. Spilsbury

P. G. Spilsbury, consulting engineer affiliated with the **Anaconda Copper Company,** died May 3rd after a brief illness, at the age of 65.

★ ★ ★

Mr. Spilsbury also served the Inspiration Copper Company, the American Brass Company and the American Wire & Cable Company.

★ ★ ★

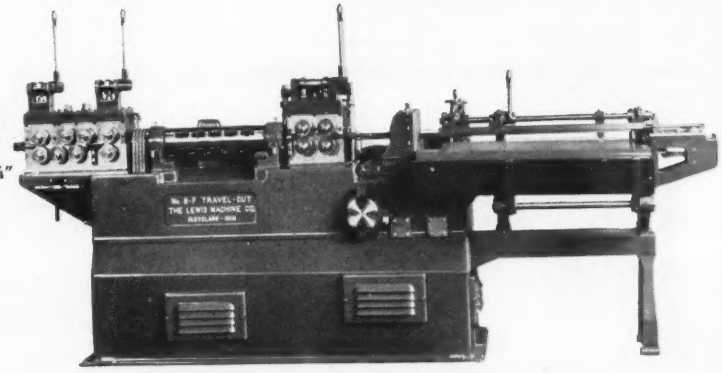
He was a former president of the Arizona Industrial Congress and past chairman of the American Mining and Metallurgical Society.

Fast, Accurate, Economical

STRAIGHTENING and CUTTING

with LEWIS **TRAVEL-CUT**

MACHINES



22 Models to handle from 1/16" to ¾" Round, Hex, Flat, Shapes.

Simple in design, rigid in construction, Lewis TRAVEL CUT will deliver continuous dependable service under the most severe, high production conditions—day in, day out. Feeds wire from the coil, straightens accurately, gauges to uniform length, and cuts clean without stopping the wire. For steel, brass, aluminum and alloy wire. Cut your cutting costs with the Lewis TRAVEL CUT. Full details on request.

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CENTRAL: Moslo Machinery Co., 2443 Prospect Avenue, Cleveland 15, Ohio.

WEST COAST: Hoffman & Heartt, 3005 So. Grand Ave., Los Angeles 7, California

CANADIAN: Empire Engineering Co., 11 Wellington St. E., Toronto 1, Ontario.

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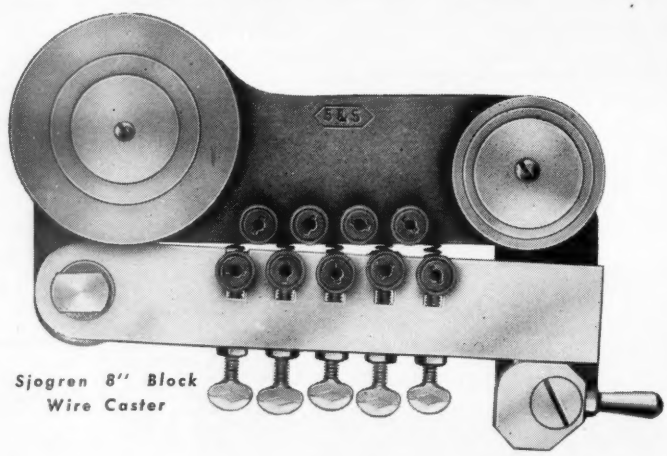
SJOGREN Killers are designed for the job—that of 'casting' wire properly. The 8" block size will handle from .005" to .020" diameters. Other Sjogren killers for larger wire gauges and blocks of greater diameter, having either clockwise or counter clockwise rotation, are made to order.

Our Silver 25 1927-1952 Anniversary Year



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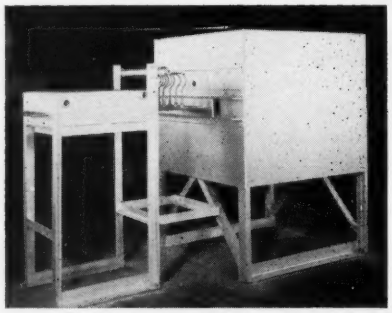
Tools for The Wire Industries

14 SWORD STREET, AUBURN, MASSACHUSETTS

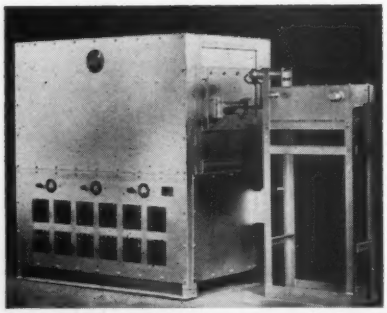
Represented in Canada by THE LARSON CO., 98 Wellington St., West, Toronto, Ont.

Harper

UNIFORM RESULTS EASILY OBTAINED ON STAINLESS WIRE With HARPER STRAND ANNEALERS



110 Strand Wire Annealing Furnace Model HOU-10224-NT-28.

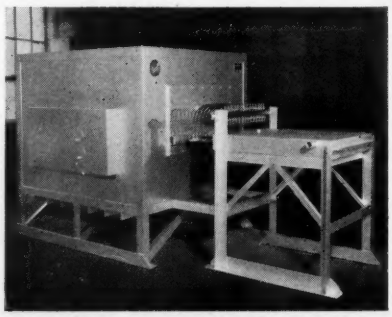


3 Strand Wire Annealing GFurnace Model HOU-5140-NT.

• Harper Electric Wire Annealing Furnaces are available in a variety of sizes to meet present day requirements for research and production annealing of fine gauge stainless steel wire.

Uniform results are easily obtained through extreme temperature uniformity during a slow anneal in a special atmosphere.

Eliminate furry results and put your stainless wire production on a trouble-free, more economical basis with a Harper Electric Strand Annealer. Our Engineers will be glad to work with you on your furnace requirements. Write today, to:



30 Strand Wire Annealer Model HOU-30240-NT-28.

HARPER ELECTRIC FURNACE CORPORATION

Dept. #12, 39 River Street, Buffalo 2, New York

International Nickel Elects Officers

Dr. Paul D. Merica, Executive Vice President and a Director, was elected President of **The International Nickel Company of Canada, Limited,** at the annual meeting of the Board of Directors on May 5th **Dr. John F. Thompson,** Chairman of the Board and retiring President, announced.

★ ★ ★

Dr. Thompson, who was elected Chairman of the Board of Directors in February, 1951, upon the death of **Robert C. Stanley,** continues as Chairman and chief officer of the company.

★ ★ ★

R. Leslie Beattie, Vice President and General Manager of the company's Canadian operations, who is moving his headquarters from Copper Cliff, Ont., to Toronto, has been elected a member of the Executive Committee of the Board and a Director of the company's United States subsidiary, The International Nickel Company, Inc. **H. C. F. Mockridge,** Q. C., of Toronto, was also elected to the Executive Committee of the Board.

★ ★ ★

With Mr. Beattie's move from Copper Cliff, **J. R. Gordon,** Assistant Vice President, has been appointed to the further post of Assistant General Manager, and in these capacities will manage all activities in the Canadian operations under the direction of Mr. Beattie.

★ ★ ★

Ralph D. Parker, Assistant Vice President, has been elected Vice President and a Director of the company's subsidiary, Canadian Nickel Company Limited, which conducts the company's vital exploration and prospecting program throughout the world.

★ ★ ★

William F. Kennedy has been named Secretary of the company, suceeding **Henry S. Wingate,** who will devote his full time as Vice President and a Director of the company.

★ ★ ★

In addition, Dr. Thompson announced the following executive changes for the company's United States subsidiary, The International Nickel Company, Inc.:

★ ★ ★

Dr. Merica becomes President, with Dr. Thompson continuing as Chairman of the Board.

★ ★ ★

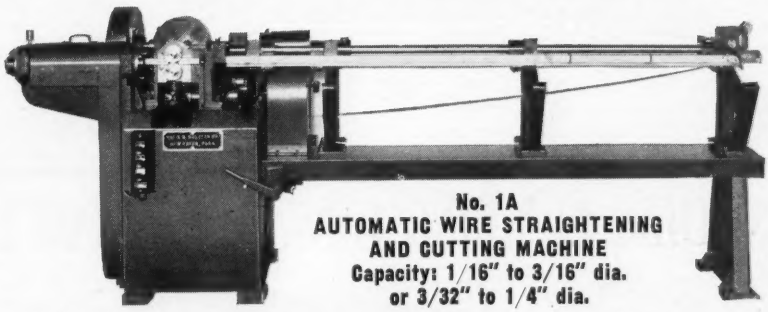
Walter C. Kerrigan, Vice President, has been elected to the newly-created position of Vice President and General Sales Manager, responsible for both nickel and mill products sales, with **L. R. Larson** elected Assistant Vice President and Assistant General Sales Manager. **Theodore H. Dauchy, Richard A. Cabell** and **John A. Marsh** have also been promoted to Assistant Vice Presidents.

G. J. Garvey Elected to Pittsburgh Screw and Bolt Board

At the annual meeting of the **Pittsburgh Screw & Bolt Corporation** held in April, Gerald J. Garvey was elected to the board of directors to succeed **Richard D. Baker,** who resigned. The other ten directors were reelected. **Mr. Garvey** is president of the **Gary Screw and Bolt Division,** Gary, Ind. Mr. Baker also resigned as vice president of sales.

★ ★ ★

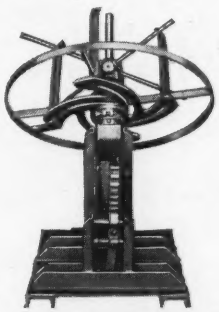
A "SHUSTER" *automatically* boosts production in wire-using plants!



No. 1A
AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE
Capacity: 1/16" to 3/16" dia. or 3/32" to 1/4" dia.

Wherever a Shuster is installed, production increases as high as 75 percent have been recorded. Shusters take wire from coil stock, then straighten and cut it to accurate lengths, all in a smooth, precision operation noted for the almost continuous wire travel. Once set, Shusters require little attention beyond keeping them supplied with coils.

Sizes available for .25" to 11/16" dia. wire; shapes, flat stock, tubing. Write us your requirements.



SHUSTER WIRE REELS
The counterbalancing weight does practically all the lifting, permitting one man to raise the heaviest coils of wire to the operating position.

Mfd. by **METTLER MACHINE TOOL, INC.**
132 W. Lawrence St., New Haven, Conn.
Representatives in all principal cities and in foreign countries.

SHUSTER *Automatic* — Since 1866 — WIRE STRAIGHTENING AND CUTTING MACHINES

A Review of Recent Wire Patents

No. 2,590,904, APPARATUS FOR INSERTING SUPPORT WIRE IN LAMP STEMS, patented April 1, 1952 by Charles L. Titus, South Hamilton, and Edwin W. Barrett, Danvers, Mass., assignors to Sylvania Electric Products, Inc., Salem, Mass., a corporation of Massachusetts.

Apparatus is provided for fabricating a button on an electric lamp stem and inserting filament support wires therein.

★ ★ ★

No. 2,591,123, WIRE-STRAIGHTENING FIXTURE, patented April 1, 1952 by Svend G. Blumensaadt, Beachwood Village, Ohio, assignor to The Universal Wire Spring Company, Cleveland, Ohio, a corporation of Ohio.

More specifically this device is for straightening the loop of a corrugated wire strip.

★ ★ ★

No. 2,591,185, WIRE SPRING STRUCTURE, patented April 1, 1952 by William H. Neely, Cleveland, Ohio, assignor to The Universat Wire Spring Company, Cleveland, Ohio, a corporation of Ohio.

The structure comprises straight, oppositely arranged, elongated, sinously corrugated wire members having loops connected by straight wire portions, corrugated wire elements of M-shaped configuration, and a corrugated wire element of Z-shaped configuration these corrugated wire elements being interposed between the wire members and clip connected thereto.

★ ★ ★

No. 2,591,285, BOLT FINISHING MACHINE, patented April 1, 1952 by Charles D. Overly, Pittsburgh, Pa., assignor to Oliver Iron and Steel Corporation, Pittsburgh, Pa., a corporation of Pennsylvania.

There are five claims to this machine for performing finishing operations on bolt blanks and like headed workpieces.

★ ★ ★

No. 2,591,505, DIE MECHANISM FOR WIRE COATING APPARATUS, patented April 1, 1952 by Earle H. Brink, Kenmore, N. Y., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Included is a mechanism removably supported at a threading position back of the wires to maintain the wires free of a coating material until the threading operation is completed and, also supported when desired, at an operating position in front of the wiping dies to maintain the dies on their supporting fingers during operation of the apparatus.

★ ★ ★

No. 2,591,608, APPARATUS FOR COVERING ELECTRIC CONDUCTORS AND CABLE CORES WITH RUBBER OR SIMILAR MATERIAL, patented April 1, 1952 by Arthur Bruce Fraser, Gillespie Richardson, Eustace Tunnicliff, and Ivan Kenneth Fisher, Leigh, England, assignors to British Insulated Callender's Cables Limited, London, Eng., a British Company.

The apparatus is adapted for vulcanizing the rubber on a coil of great length.

★ ★ ★

No. 2,591,794, GAS-FILLED POWER CABLE WITH EMBOSSED TAPE, patented April 8, 1952 by Lawrence C. Ebel, Dobbs Ferry, N. Y., assignor to Anaconda Wire and Cable Company, a corporation of Delaware.

About the wire conductors is a sheath and between the two is a specially-constructed metallic spacer tape for spacing the outer surface of the insulation from the inner surface of the sheath.

★ ★ ★

No. 2,592,019, WIRE CUTTING MACHINE, patented April 8, 1952 by Horace E. Farnett, Crescent Park, N. J., assignor to Radio Corporation of America, a corporation of Delaware.

The machine is for simultaneously cutting, to a desired length, the oppositely located outwardly extending lead wires of prefabricated electrical components.

★ ★ ★

No. 2,592,590, SPRING WINDING APPARATUS, patented April 15, 1952 by Charles R. Oberg, San Diego, Calif.

Included is a guide member mounted for back and forth movement parallel to the axis of a mandrel and having a face adjacent the mandrel surface disposed to press against the wire wound on the mandrel in a direction parallel to the mandrel, thereby to determine the spacing between the coils of a wire spring being wound on the mandrel.

★ ★ ★

No. 2,592,922, CORSAGE PIN, patented April 15, 1952 by James H. Lucier, Northbridge, Mass.

The pin is constructed of a single length of wire, formed into a pair of double re-

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 453 Main St., Stamford, Conn.

ANOTHER PICKLING TANK READY FOR LONG SERVICE LIFE

Sheet Neoprene Rubber-Lined Pickling Tank.

• **LONGER SERVICE LIFE** assured in your lined acid tanks by our many years experience in selecting and applying the best lining for your specific requirements.

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versed loops connected by a Z-shaped portion.

★ ★ ★

No. 2,593,953, DOUBLE NOSE COIL SPRING, patented April 22, 1952 by William E. Wunderlich, Muncie, Ind., assignor to Burton-Dixie Corporation, Chicago, Ill., a corporation of Delaware.

It is stated that the spring assembly is such that there is provided a free hinge action between adjacent springs.

★ ★ ★

No. 2,593,984, TENSION CONTROL AND STOP MOTION FOR STRANDED WIRE CABLE MAKING MACHINES, patented April 22, 1952 by Frank A. Clary, Jr., and Grant N. Willis, Bristol, Conn., assignors to Johnson Steel & Wire Company, Inc., Worcester, Mass., a corporation of Massachusetts.

In employing a number of wires, there is provided a device for driving a drum to wind cable thereon, without appreciable tension, means responsive to the pull on each wire, as it unwinds from its spool, for automatically controlling the application of a retarding force to each spool, whereby the complete cable formed from these wires is made of uniform wire lengths.

★ ★ ★

No. 2,594,096, PROCESS FOR TREATING WINDINGS WITH COMPLETELY-REACTIVE COMPOSITIONS, patented April 22, 1952 by Warren M. Trigg, Wilkinsburg, Pa., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania.

The process is applicable to applying a predetermined amount of an insulating resin to a winding so that the composition will freely penetrate into the interstices of the winding.

★ ★ ★

No. 2,594,610, IDENTIFICATION MEANS FOR STRANDED CABLES, patented April 29, 1952 by Earnest C. Cripe, Goshen, Ind.

An identification strand is provided, greater in diameter than any of the intertwisted strands and being wrapped spirally upon the cable and being exposed on the external surface of the cable for its entire length. The strand is recessed in the exterior surface of the cable so that no portion thereof projects beyond the outer diameter of the cable.

★ ★ ★

No. 2,594,707, STATOR WINDING MACHINE, patented April 29, 1952 by Ernest C. Allen, Rochester, N. Y., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

This machine comprises a fixed stator core holder, fixed wire anchors, an axially movable and rotatable shuttle having passages through which wires are threaded and secured to the anchors, a shuttle reciprocating device which axially moves the shuttle through the stator core, means for rotating the shuttle while outside of the core in order to form the end loops of the coils, wound on the core, a device for determining the angle of rotation and including a cam follower operatively connected with the shuttle and a series of cams which are moved in sequence into position to receive the cam follower, winding turn counting means, and means under control by the turn counting means for positioning the cams in succession to the cam follower.

★ ★ ★

No. 2,594,854, AERIAL CABLE WITH EXTERNAL RADIO SIGNAL REFLECTION CORRECTION, patented April 29, 1952 by Felix Bloch, Palo Alto, Calif., assignor to the United States of America as represented by the Secretary of War.

The cable is for use in a zone of transmission of radio object—locating signals and includes an inner cable constructed of a continuous conducting part of wire, an insulating material at least partially covering this inner cable, sleeves constructed of a conducting material overlying the insulating material, the sleeves being spaced at intervals along the length of the cable, and armor material spirally wound around the insulating material and the sleeves with interstitial space between the convolutions, the sleeve lengths and spaces between the sleeves being proportioned in a definite relation to a given band of external radio signal frequencies incident externally on the cable.

★ ★ ★

No. 2,594,958, GARMENT HANGER, patented April 29, 1952 by Andrea P. Masciana, Washington, D. C.

A hanger is provided, constructed of a single length of wire and adapted to support trousers by the belt loops as well as support a coat in the ordinary manner.

★ ★ ★

No. 2,594,966, CLOTHES HANGER, patented April 29, 1952 by James R. McKinney, Cleveland, Ohio.

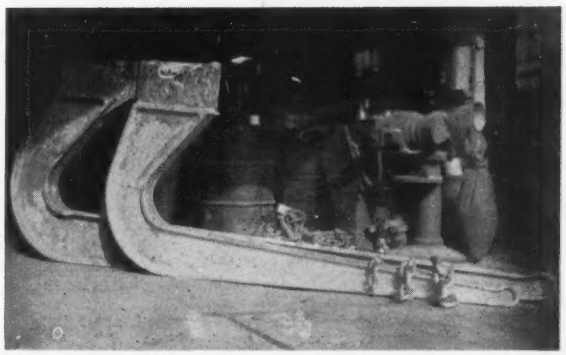
This hanger is made up of several lengths of wire.

★ ★ ★

Use "ALBRO" METAL HAIRPIN HOOKS *and other* PICKLING EQUIPMENT *for economy*

THEY LAST!

1. We specialize in the manufacture of pickling equipment.
2. Our engineers are at your service to help you on pickling problems.
3. We build equipment to your specifications.
4. Send us your drawings and let us quote.
5. Write, wire or telephone.



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Westinghouse Announces Patent Award Policy

A new program to provide additional rewards for meritorious inventions has been announced by President **Gwilym A. Price.**

★ ★ ★

Patent Disclosure Committees in the various Company Divisions will administer the new program, which is designed to provide added incentive for inventors. The new award is the "Most Meritorious Disclosure Award".

★ ★ ★

From every 50 patent disclosures it receives, each committee will select the one its members judge as "most meritorious". This disclosure will be submitted to the Division Manager. When he approves the selection, the inventor will be paid $200.

★ ★ ★

Where two or more inventors are involved in the same disclosure a total of $300 will be divided equally among them.

★ ★ ★

All disclosures received in the Company's Patent Department after January 1, 1952, are eligible for the award.

★ ★ ★

Mr. Price emphasized the new award was set up to further increase the stimulating effect of the Company's voluntary invention award plan. There are now four awards specified:

1. An award of $25 paid to each inventor who submits a meritorious disclosure.

2. The "most meritorious" disclosure award just described.

3. An award of $50 paid to each inventor at the time an application for a patent covering his invention is filed in the U. S. Patent Office.

4. Special awards, as high as $5,000 made to inventors where the invention has proved of outstanding commercial value.

Acropak Introduces Two New Spools

To meet the current need for reducing spooling costs in the wire industry, the **Acrometal Products Company** of Minneapolis, Minnesota, has designed and produced two new spools, in 2½" and 6½" sizes, that offer production advantages and economies in the matter of packaging.

★ ★ ★

Their new 2½" spool has been designed especially for fine wire packaging. It is light-weight drawn aluminum with proven strength and durability. The end plates are flat to accommodate the wire producers present labels. Polished aluminum provides sparkling sales-appeal that improves the appearance of the package.

★ ★ ★

The new 6½" spool is of welded construction with exceptional rigidity and strength. Yet the weight is approximately 40% less because of the aluminum alloy used. Freight savings are marked and these should pay for the spools within a reasonable period of time. Additionally, the larger size permits more wire on the package, which is a production advantage.

★ ★ ★

Acrometal Products, Inc. has recently expanded its engineering department and tool room facilities in order to handle spooling problems of wire manufacturers—both for shipping and for drawing. They produce not only a complete line of standard size spools, but can design and produce special spools for special purposes. The firm is located at 616 North Fifth Street, Minneapolis 1, Minn.

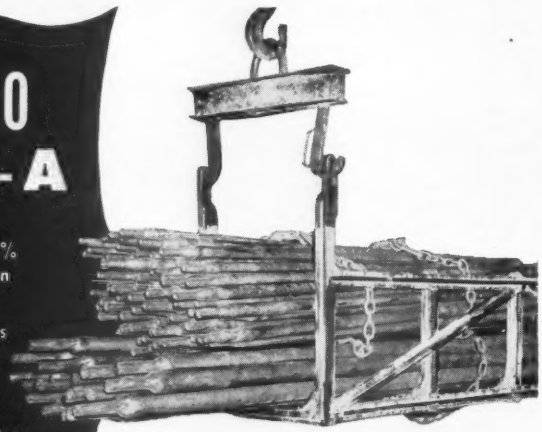
NOPCO 1067-A

★ saves over 30% sulfuric acid solution in pickling of iron, steel and nonferrous metal products

★ aids processing

★ speeds production

★ assures improved output



Add Nopco 1067-A to the pickling bath, and you reduce loss of sulfuric acid solution through carryover to the rinsing tank by 30% to 40%.

Here's a definite economy, of outstanding benefit today when current restrictions limit the use of sulfuric acid.

But Nopco 1067-A not only effects high drainage, it also affords such important advantages as these:

★ ***faster, deeper, and more uniform penetration of oxide scale—resulting in elimination of pitting, lower metal losses, and smooth, clean surfaces after pickling***

★ ***reduced operating time and lower costs—since better drain-off means fewer rinsings for complete acid removal***

★ ***reduced acid contamination in operations following pickling—with the result that tool and die life is increased***

★ ***easier acid disposal—since acid is localized in first tanks***

In a word, addition of this unique surface tension depressant to your sulfuric acid pickling solutions not only means *money in your pocket,* but more satisfactory products coming off your production line.

LET US TELL YOU ALL ABOUT NOPCO 1067-A. MAIL THE ATTACHED COUPON TODAY.

NOPCO CHEMICAL COMPANY
Harrison, N. J.

BRANCHES: Boston • Chicago
Cedartown, Ga. • Richmond, Calif.

Nopco Chemical Company ——Dept. W
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Gentlemen:
Please send me full information about Nopco 1067-A.

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Firm.....
Address.....
City.....Zone.....State.....

Heil Develops Heat Exchanger

The new #1251 Heil Heat Exchanger has been developed by the **Heil Process Equipment Corp.,** Cleveland, Ohio, to meet the demand for an economical external type heat exchanger for heating shallow tanks used for continuous wire pickling and galvanizing. This double-pipe exchanger provides continuous even distribution of heated pickling or galvanizing solution and eliminates splashing common with other type heating equipment in shallow tanks. This complete "package" unit can be used with either sulphuric or muriatic acid pickling solutions.

★ ★ ★

Engineered in a wide variety of complete "package" standard units, the #1251 Heat Exchanger is easy to install and requires a minimum of time and labor for conversion from present setup or for new installation.

★ ★ ★

Heating and cooling can be accomplished with the same unit eliminating the necessity of separate units. Tube materials available in standard designs include "Nocordal" impervious graphite, nickel, stainless steel, carbon steel and Carpenter 20. This makes possible wide application in practically all corrosive solutions and complete interchangeability of tubes.

★ ★ ★

A great degree of flexibility of control is possible with the #1251 Heat Exchanger. An installation includes either a one tube unit or a series of one tube units. These units can be individually controlled to give additional economy.

★ ★ ★

For further information, write Heil Process Equipment Corp., 12901 Elmwood Avenue, Cleveland 11, Ohio.

Vascaloy-Ramet Opens Warehouse in Birmingham

Vascaloy-Ramet Corporation has established a regional warehouse and a sales and service organization in Birmingham, Ala.

★ ★ ★

The Birmingham facility will serve the company's distributors in Alabama, Mississippi, Florida, Tennessee, Georgia and North and South Carolina.

★ ★ ★

The company, a subsidiary of Fansteel Metallurgical Corporation, of North Chicago, is one of the largest producers of tungsten carbide and set up in Birmingham because of the continuing industrial development of this section.

★ ★ ★

Service engineers, mechanics and production experts will be available to work with southeastern industries.

Chain Belt in New Offices

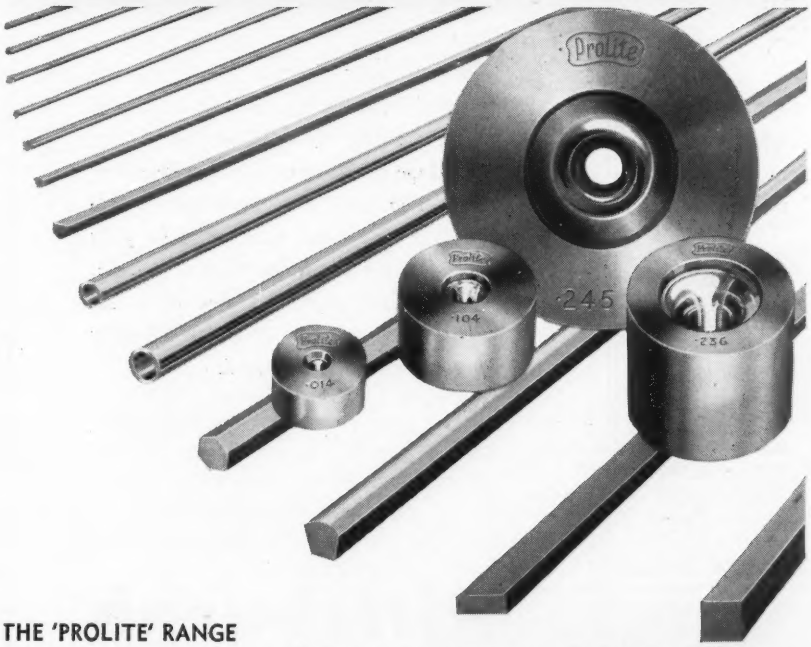
Chain Belt Company, is now occupying its new administration building, located at 4701 W. Greenfield Avenue, Milwaukee, Wisconsin. For the past 50 years, the firm had its executive headquarters at 1600 W. Bruce Street, Milwaukee.

★ ★ ★

The new building, of brick, stainless steel and glass construction, is directly adjacent to its Milwaukee manufacturing facilities, and houses the offices and departments of General Administration, Field Sales Administration, Sales Promotion and Advertising, Purchasing, Accounting, Statistical, Tax, Cost and Castings Sales.

Leading British Manufacturers use Prolite DRAWING DIES

CEMENTED TUNGSTEN CARBIDE



THE 'PROLITE' RANGE OF MUREX METALLURGICAL PRODUCTS INCLUDES:

Tungsten Carbide Tips and Tipped Tools, Bar, Tube and Wire Drawing, Extruding and Metal Forming Dies and Die Pellets, Cold Heading Dies, Nozzles, Guides, Bushes and other Wear Resisting Parts.

MUREX LTD. (Powder Metallurgy Division) RAINHAM • ESSEX • ENGLAND

London Sales Office: Central House, Upper Woburn Place, London, W. C. I.

New Cable Cutting Machine Developed By James L. Entwistle Co.

The James L. Entwistle Co. of Providence, Rhode Island, builders of machinery for the wire and cable industry, announces the development of a new cable cutting machine. This Cable Cutter, Type A-1, uses a combination of an air-operated cutter and an assistance heating unit to cleanly cut stranded steel cable up to 1/4 of an inch in diameter.

★ ★ ★

Pneumatically operated clamps hold the cable while the cutter blade removes a slug from the cable. These clamps also serve as the electrical contacts for passing low voltage-high-current through the cable and at the same time stretch the cable at the cutting point. The whole operation is automatic, requiring only 3 seconds, once the cable is positioned and the starter button pressed.

★ ★ ★

The sheared cable ends are slightly "necked down" making insertion into cable terminals easier. Close length tolerances may be maintained because the cable ends are uniform and square after shearing. Fraying or unraveling is reduced to a minimum by heating and cutting operation.

precision
wire straightening
and cutting
for all industry...
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Whenever your wire straightening or cutting problem calls for close tolerances and uniform quality, it will pay you to take advantage of Pittsburgh Cut Wire's long experience to all industry. Expert workmanship and exact machining to your specifications for more than a decade, combine to give you the experience that will serve you best. Call on us for your wire straightening and cutting needs.
Straightening & Cutting in diameter ranges from 1/16" to .005" in all types of wire.
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cut wire company
1120 Galveston Ave. Pittsburgh 12, Pa

Alcoa To Produce Insect Screening

Aluminum Company of America has purchased the equipment for manufacturing insect wire screening formerly owned and operated by the Woven Wire Fabrics Division of the **John A. Roebling's Sons Company.** The company will use this equipment for the manufacture of aluminum insect wire screening.

★ ★ ★

The equipment, now located at Roebling, New Jersey, will be moved to an Alcoa plant for reconditioning. The company has not yet reached a decision as to where the wire weaving operations will be located. It is anticipated that Alcoa will be producing aluminum screening by the latter part of the current year.

Eisler High Speed Continuous Bottoming Machine

A High Speed Automatic Bottoming Machine has been developed by the **Eisler Engineering Co., Inc.,** 750 South 13th St., Newark 3, N. J., for making round or flat bottoms, vials, eye droppers, or similar products such as small bulbs for radio tubes and telephone lamps. The machine can be described approximately as follows:

A. Small telephone lamps and similar round bottom glass items. B. Flat bottoms. C. Long round bottoms. D. A constricted miniature tube bulb. E. A lip for vials. F. Round bottom with a hole for eye droppers. G. Flat bottom with a hole for eye droppers. H. Constriction made for fluorescent lamp starter bulbs.

★ ★ ★

The machine can be adapted to handle all kinds of glass tubing, soft glass or pyrex glass, from 1/8" to 3/4" diameter, and the length of the finished product can be adjusted from 1" to 6". The production output ranges from 8,000 to 16,000 per hour, depending on the tube diameter, wall thickness, and the nature of the glass tube products.

★ ★ ★

The sturdily constructed framework with fabricated table and legs carries the driving mechanism, which is powered by a ½ HP motor and speed reducer. A series of rotating shafts with glass roller moves continuously, while taking the blank tubing off the automatic hopper feed. The glass tubing is carried in a horizontal position under a row of ribbon burners. These ribbon

burners are placed on the bottom and on the top of the glass, and the finished product is discharged on the opposite end of the machine. Various other types of glass which have similar operations can be easily adjusted on the machine.

★ ★ ★

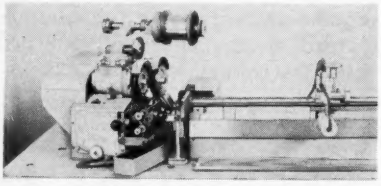
The operation of the machine is very simple. The glass is cut in double length. The operator loads the hopper feed, and the rest of the operations are fully automatic until the products are complete and roll off the machine. One operator can easily feed 15,000 pieces per hour.

★ ★ ★

Floor space: 30″ x 135″ x 80″ high. Approximate weight: 1600 lbs. H.P. required: ½.

Develops Machine to Coil Resistance Wire

Driver-Harris Company of Harrison, N. J., makers of alloys, have developed a revolutionary resistance wire coiling machine. Designed to



overcome the difficulties hitherto experienced in the production of coils for heater elements of electrically heated appliances, it assures fast, uniform, accurate coiling without damage to wire.

★ ★ ★

The standard model coils No. 20 to No. 36 B & S gauge wire. Units for other gauges can be made to order. The Driver-Harris Bulletin C-52 gives full information.

Speeds Wire Products to Flood Areas

The American Steel & Wire Division of the U. S. Steel Company acted in April to speed shipments of fence, building nails, barbed wire and other vitally needed construction materials to flood ravaged areas.

★ ★ ★

W. F. Munford, Vice President Operations, sent telegrams to the five District Operating Managers of the division instructing them to expedite the manufacture and shipment of such materials to disaster areas. These managers were: **A. J. Hoyt,** Cleveland; **N. W. Dempsey,** Chicago; **J. A. Slenker,** Duluth **L. F. McGlincy,** Pittsburgh; and **G. A. Gleason,** Worcester.

★ ★ ★

He expressed the opinion that fence, barbed wire, and nails will be items most urgently needed at once, but that numerous other items produced by the division, such as electrical cable, reinforcing mesh and bars, and many others, will be required for rehabilitation work.

Warner Company's New Cedar Hollow Kiln in Operation

Under construction for seventeen months, the **Warner Company's** new rotary kiln No. 2 at Cedar Hollow was fired early this year and is now in full operation.

★ ★ ★

The kiln was designed and executed by Warner's own engineering staff under the direction of **Irving Warner,** Vice President. **E. L. Shoemaker,** Chief Engineer, supervised the structural and foundation work; **L. I. Laufenberg** was project engi-

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neer; and **A. I. Martindale** supervised the mechanical and electrical work. Erection of the kiln was under the supervision of **S. G. Frederick,** Construction Superintendent.

★ ★ ★

All of the company's shaft kilns have been closed and the two rotary kilns produce all the dolomite lime now sold to their customers. It is interesting to note that the new No. 2 kiln has over one and a half times the combined capacities of all the old shaft kilns at Cedar Hollow and McCoy that it replaces, placing the company in a favorable position to serve its customers with dolomitic lime products.

Pangborn Offers Bulletin on Control of Industrial Dust

The Pangborn Corporation, Hagerstown, Maryland offers a 28-page, two-color bulletin entitled The Control of Industrial Dust. Purpose of the book is to describe Pangborn Dust Control and its many applications. Case histories of users of Pangborn equipment are documented with photographs and performance data indicating savings achieved through the installation of dust control equipment.

★ ★ ★

Featured in the booklet is the Pangborn "CH" system of control which utilizes cloth type filters for the collection of finely divided dry dusts. A characteristic of this system is high recovery at economical cost. All elements of the system are described and illustrated, with diagrams showing how the entire system operates.

★ ★ ★

Specifications on sizes and dimensions of Pangborn equipment are listed as well as construction details. Application and engineering data are tabulated according to types of dust, and collection requirements. It is possible to determine the probable requirements for a dust collection system from the engineering tables. However, it is recommended that actual engineering of the system be referred to the Pangborn engineering department.

★ ★ ★

For copies of this bulletin—Number 909A—write to the Pangborn Corporation, Hagerstown, Maryland.

Kaiser Making Automotive Cables of Aluminum

Availability of a new automotive electrical cable made of aluminum wire has been announced by **Kaiser Aluminum & Chemical Sales, Inc.**

★ ★ ★

Designed for use between the solenoid and starter motor or generator, depending on the circuit, the new cable is marketed by Kaiser in bulk lengths to fabricators who make the finished cable assemblies.

★ ★ ★

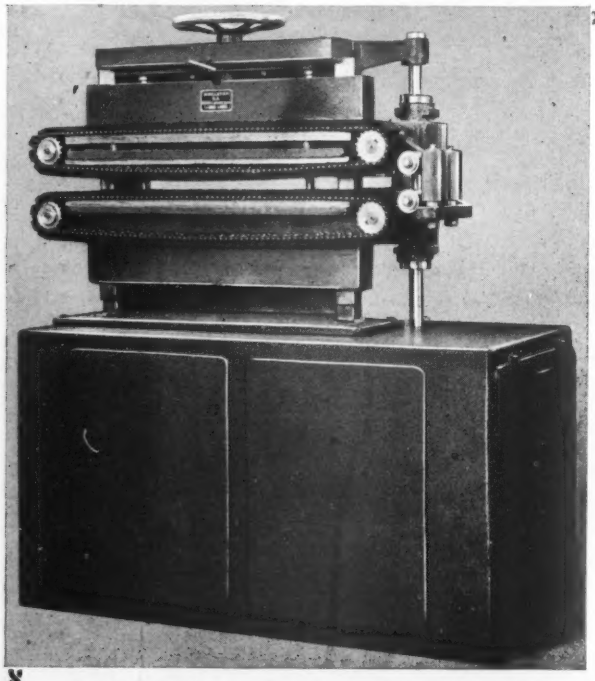
The cable, produced at their Newark, Ohio, plant is stranded with all-aluminum EC grade wires of special temper to all standard sizes required by the automotive industry. In the #1/0 AWG size, for example, the cable is made up of seven bunches, each containing 38 strands of #24 AWG wire.

★ ★ ★

Kaiser adds a covering of neoprene to the cable for insulation and subjects it to electrical and mechanical tests prior to shipment.

★ ★ ★

Assembly fabricators cut the aluminum cable to required lengths, strip and ends and apply inhibitor compounds. Aluminum thimbles are crimped on the ends and punched to form terminal lugs.



The unit can be adapted to special requirements.

CATERPILLAR DRAW-OFF

FEATURES

- *No bending* of the cable.
- Low pressure on the cable.
- Handles tough *and* delicate jobs.
- Easier operation.
- Takes *less* floor space. (all above floor)
- Requires no special foundation.

Write for ratings and quotations to

MAILLEFER S. A.

RENENS, SWITZERLAND

Manufacturers of Cable Machinery for Over 50 Years

Development of the cable for automotive use is a part of the current rapid expansion of aluminum into a growing variety of new electrical applications. It is based on years of successful use of aluminum for power transmission and distribution lines because of the metal's lower cost and increasing availability.

★ ★ ★

Inquiries on the new cable may be directed to Kaiser Aluminum's general sales office, Palmolive Building, Chicago, or to anyone of its local sales offices.

Catalog Describes Thermistors

A new 30-page catalog (TH-5) describing Carboloy Thermistors is now available from **Carboloy Department of General Electric Company**, Detroit 32, Michigan.

★ ★ ★

The catalog contains general basic information relating to physical and operating characteristics of Thermistors, which are electronic semiconductor control elements whose electrical resistance responds negatively to minute temperature changes.

★ ★ ★

Typical Thermistor applications and wiring diagrams are listed. Graphical data of temperature-resistance ratio characteristics for rod, disc and washer-types are included.

★ ★ ★

Specifications, characteristics and typical applications of standard Carboloy rod, disc and washer-type Thermistors are also given in the catalog.

★ ★ ★

The last page of the catalog is devoted to suggested applications for Thermistors in various industries.

Carboloy's New Edmore Plant Held Open House in June

The new standard carbide tool fabricating plant of the **Carboloy Department of General Electric Company** at Edmore, Michigan, was shown to employees and their families and to local residents at open house festivities on June 5, 1952.

★ ★ ★

The newly completed 45,000 sq. ft. plant is now mass producing standard carbide tools on a production line basis. It is located on a 33-acre plot just outside the rural community of Edmore, Michigan, 60 miles west of Saginaw.

★ ★ ★

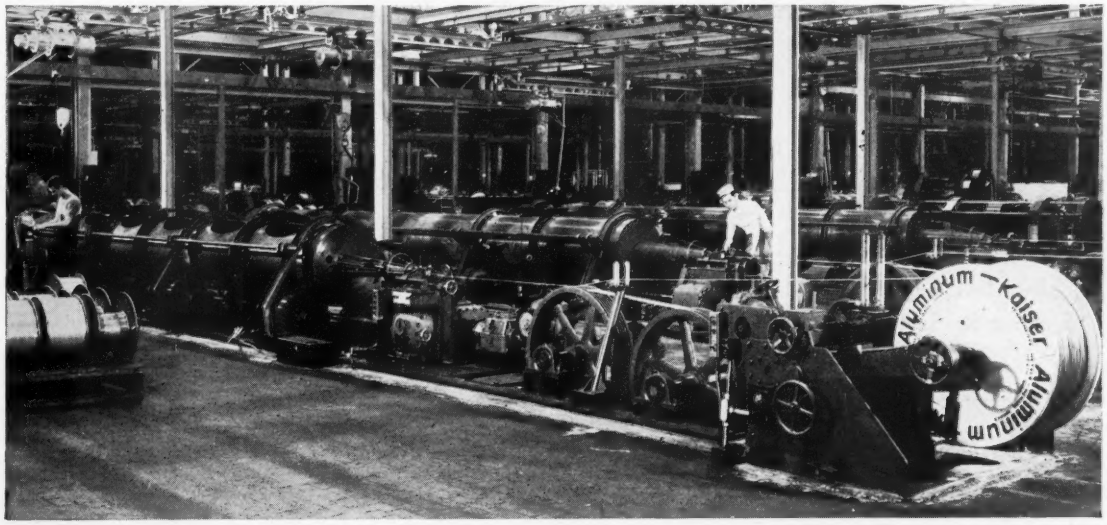
Approximately 3,000 residents of the Edmore community area were on hand for the Open House ceremonies that included plant tours, product displays, entertainment and a speech by **Chester H. Lang,** General Electric Vice President in charge of Public Relations. **K. R. Beardslee,** Carboloy Department General Manager, **Robert Paxton,** GE Executive Vice President and **Justin R. Whiting,** Chairman of Board, Consumers Power Company, were also on the program.

★ ★ ★

The new Alnico permanent magnet manufacturing plant, to be completed in 1953, will be located adjacent to the Edmore plant.

NEW 22" SPOOL 750 RPM TUBULAR STRANDER

HYDRAULIC LIFT REEL STAND — INFINITELY VARIABLE TRAVERSE AIR CONTROLLED
DOUBLE DRUM HAUL-OFF WITH LINK BELT P.I.V. — AIR OPERATED BRAKING SYSTEM



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Industrial Diamond Prices Rise

Manufacturers of diamond grinding wheels, diamond powder and diamond grinding compound were authorized in May by the Office of Price Stabilization to adjust their ceiling prices to reflect part of the increased cost of crushing bort up to July 1, 1952.

★ ★ ★

This action is covered by Supplementary Regulation 7 to the machinery and related products ceiling price regulation CPR 30. It is effective May 17, 1952.

★ ★ ★

The ceiling price adjustment authorized is the amount by which the increase in the cost of crushing bort exceeds two percent of the existing ceiling price of the article. This is the amount of price adjustment found to be necessary under the industry earnings standard, OPS said.

★ ★ ★

Some manufacturers import diamond bort while others buy from domestic dealers. In either case the prices paid are based upon the prices established in foreign markets. The price of crushing bort in London was increased by approximately 23 percent on January 1, 1952. Data submitted to OPS indicates that the cost of diamond bort generally amounts to from 50 to 70 percent of a manufacturer's selling price for diamond grinding wheels, powder and compound.

★ ★ ★

The cut-off date of July 1, 1952, will allow time for the increased prices of crushing bort to become fully effective at all levels, and will give manufacturers sufficient time to file with OPS the required reports reflecting cost increases.

★ ★ ★

Manufacturers of diamond grinding wheels, powder and grinding compound, desiring to adjust their ceilings to reflect increases in cost of bort, must file a report with OPS by registered mail, and may put their adjusted ceilings into effect as soon as they receive the registered mail return receipt.

★ ★ ★

Manufacturers who previously exercised the option to continue to use ceilings established under the General Ceiling Price Regulation (GCPR) are also required to file a report with OPS if they now desire to establish ceilings under the supplementary regulation issued recently.

★ ★ ★

Manufacturers may establish ceilings under the so-called Capehart amendment to the Defense Production Act, as provided for under SR 4 to CPR 30, or under today's SR 7 to CPR 30, but not under both. However, if adjusted ceilings are established now under supplementary regulation for diamond grinding wheels, powder and grinding compound, the manufacturer may use SR 4 to CPR 30 to obtain Capehart adjustments for other commodities he produces.

New President for Salem-Brosius

Ward A. Wickwire Jr. was elected president of **Salem-Brosius Inc.**, Pittsburgh, Pa. He has held positions of executive vice president of the company since 1951 and vice president since 1947. He succeeds the late **W. A. Wickwire Sr.**

Yes.. CARBIDE TOOLS WILL WEAR OUT.. *But*..

Lundahl CARBIDES

TAKE THEIR TIME ABOUT IT!

Lundahl carbide tools last and last and last! They provide sensational production on your spring-making machines because they are specially selected and graded.

Lundahl engineers will provide just the right carbide tools for your Sleeper & Hartley, Torrington, Samuels or other spring-making machines. Let us show you how to save money on spring-making jobs.

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Ask about the Lundahl set-up tool kit for spring makers. Wire today. There's no obligation.

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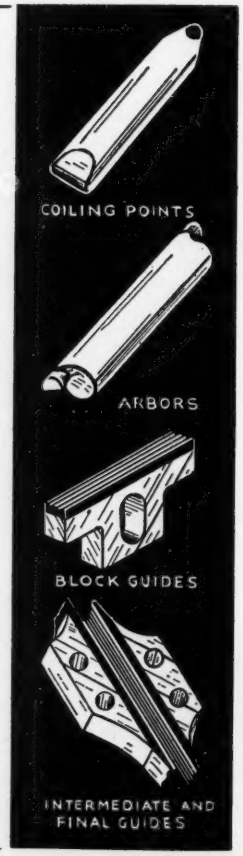


New Hardenability Tool Given to Industry by U. S. Steel

A tool to help improve defense production has been made available, free of cost, to all American manufacturers of steel, the **United States Steel Company** has announced.

★ ★ ★

Research officials explained that the "tool" is not a "gadget," but a patented method for predicting in advance the hardening characteristics of steel compositions. As varying degrees of "hardenability" are indexes to the usefulness of steel for specific tasks, this knowledge will enable operating men to produce the types of steel that will exactly suit such diverse assignments as tough tank armor, strong struts for aircraft, brittle fragmentation bombs, or easily formable cases for shells.

★ ★ ★

Conversely, the patented method makes possible the design of steels of required hardening characteristics from the available supply of steelmaking materials. Since many alloying elements normally used for special steels are now in short supply and others would be short if war blocked world sea lanes, the new method will be of great assistance in making maximum use of existing supplies of traditional elements or of other elements that may be substituted to give approximately the same service.

★ ★ ★

Patent was issued July 3, 1951, in the name of **Marcus A. Grossmann,** and assigned to United States Steel Company, where Dr. Grossmann is adviser in research planning. The patent was recently dedicated to the public by U. S. Steel. This action makes it available to all interested parties.

★ ★ ★

The "hardenability" of a steel is measured as the depth from the surface to which a given steel composition hardens when quenched. Steel men have known for many years that hardenability in general depends on the chemical composition of a steel—the quantities of various ingredients, such as carbon, manganese, molybdenum, chromium, nickel and others, that are added to the iron to make different kinds of steel. By careful experiments and tests of his results, Dr. Grossmann was able to assign definite hardenability values to these elements. By now great tonnages of steel have proved the validity of his findings.

★ ★ ★

The most important use of the patent is in conserving our dwindling supplies of certain scarce alloying materials. In one column can be set down the hardenability needed for a given job. In a parallel column is set down the quantities of alloying elements available to work with. With this information and the new data steels can then be designed with the required hardenability from available materials.

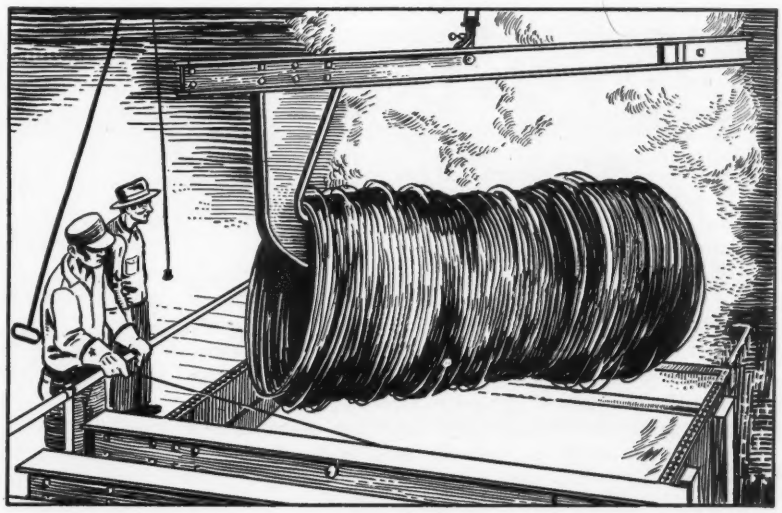
Gas, Oil Burner Programming Control

Fireye Programming Control Type 26RJ8 is designed to provide automatic starting and programming control for commercial and industrial gas, oil, and combination gas/oil burner equipment. It is used with the new Firetron Scanner Type 48PT1 to protect burner installations from the hazard of flame failure. The control automatically starts a burner in operation and pro-

THERE'S A **SPECIFIC NEP** INHIBITOR
FOR YOUR PICKLING DEPARTMENT

Use NEP #33 INHIBITOR [Non-Foaming Liquid]
and add SUMFOAM COMPOUND for foam blanket,
or use NEP #47 INHIBITOR (Powdered Foaming Product).

These products have been tested, used and approved by major wire mills everywhere!



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IN STEEL SINCE 1860

THE BEST FOR COVERING . . .

The **POURTIER** HIGH-SPEED
INDIVIDUAL INSULATING MACHINE

INDIVIDUAL HEADS handling wire sizes of 7 to 32 A.W.G. Other models made with up to four (4) serving bowls.

POURTIER MACHINES will serve cotton, paper, cambric, fiberglas, silk, nylon and cellulose acetate at speeds of 4500 r.p.m.

EQUIPPED WITH:

9 speed gear box for the haul-off capstan, automatic central lubrication and slow starting mechanism. Speeds easily changed. Bowls with compensator controlling the unrolling of the bobbin and a quick stopping device, in case of breakage of insulating material. Special control to change the direction of the motion of the heads. Traverse motion's speed and displacement easy to set up.

Machines are built to meet AMERICAN STANDARDS

SHORT DELIVERIES — LOW PRICES

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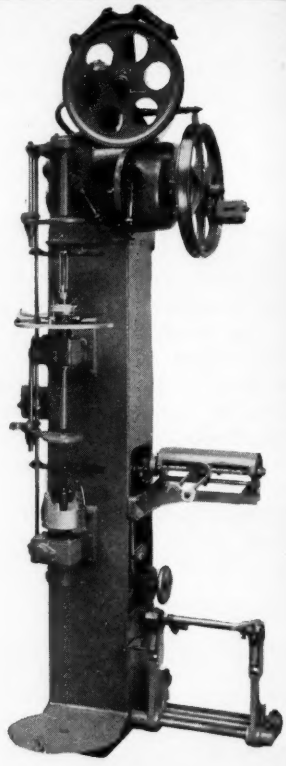
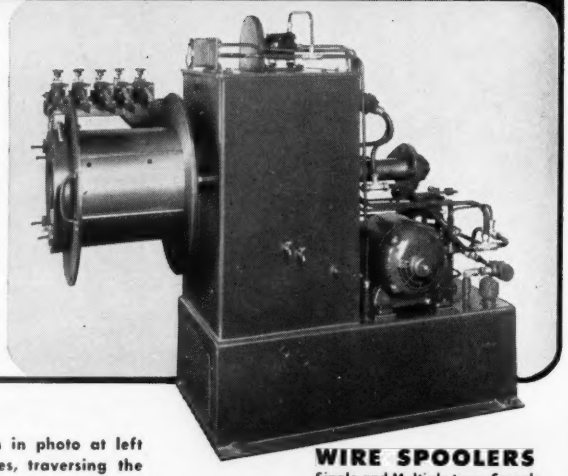


INSULATING MACHINE IM 402

COIL 5 STRANDS IN 1 OPERATION

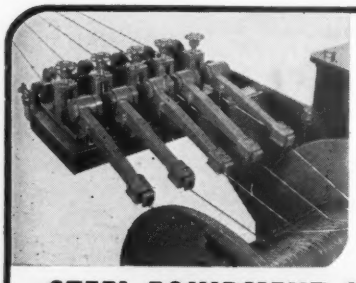
SECO TRAVERSE REEL SPEEDS UP PRODUCTION

This new SECO Traverse Reel winds five separate coils of flat wire or narrow strip *at the same time.* Coils are oscillated-wound, permitting much longer lengths than conventional ribbon-wound coils. Smooth, powerful hydraulic operation gives coiling speeds as high as desired, accurately controlled from zero to top running speed.



WIRE SPOOLERS

Single and Multiple type. Speeds up to 4,000 feet per minute.



Method of coiling is shown in photo at left The complete block oscillates, traversing the wire into five 3" wide coils. Traverse and tension control are extremely accurate. 1/8" to 1/2" wide flat wire can be wound. Block has 16" inside diameter and 24" outside diameter.

Call or Write for Information and Complete Data — No Obligation

STEEL EQUIPMENT CO.

P. O. Box 737, Warrensville Station, Cleveland 22, Ohio

SECO

grams a sequence of pre-purge, ignition-on, fuel valve delay, post-ignition timing, and post-purge.

★ ★ ★

Programming Control Type 26RJ8 incorporates many unique design features. Its instantaneous response to flame failure results in complete fuel cut-off in 2 to 4 seconds, providing maximum protection from explosion hazards. A built-in time delay prevents false shutdown from transient effects, such as smoky streaks in the flame or irregular draft conditions. Timing is accomplished through a high torque synchronous motor, insuring positive, accurate sequencing. All contact assemblies make use of over-size contacts and operate with snap action. Cam assembly construction permits programming variations to meet the needs of every type of automatic burner.

★ ★ ★

The Control is designed to provide continuous operation under the most exacting ambient conditions to be encountered on industrial installations and bears the labels of Underwriters' Laboratories Inc., and Factory Mutual Laboratories. Terminal connections are available for directly handling flame failure alarm and modulating motor. Plug-in construction of the chassis provides for simplified replacement and maximum accessibility for examination or adjustment. The control is rugged in design, built to withstand vibration and simple to install.

★ ★ ★

For additional information, please write to **Photoswitch, Inc.**, 77 Broadway, Cambridge 42, Mass.

★ ★ ★

Aluminum Coating of Wire

"**A** considerable amount of work is being done to extend the application of aluminum coatings to steel products. Wire is well along the way in the process of development. Aluminum coated sheets, as you know, have been on the market in relatively small quantities for a number of years. There are signs indicating that the product may grow."

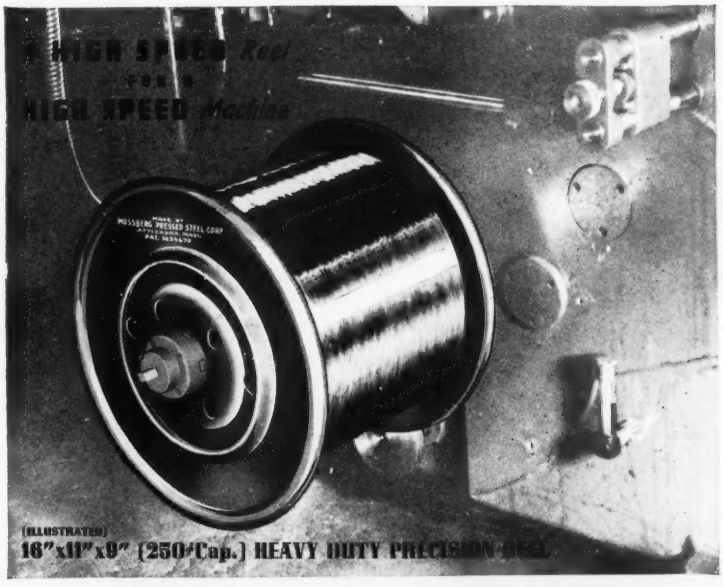
—Excerpt from paper by R. E. Zimmerman, U. S. Steel Company, delivered before The Engineers' Council of Houston (Texas) on April 12, 1952.

"Corrosion Resisting Properties of the Austenitic Chromium-Nickel Stainless Steels"

This booklet contains 32 pages with 18 tables showing the results of tests on numerous austenitic stainless steels in various solutions, acid, neutral and alkaline. It is a general publication that covers: the mechanism of corrosion resistance in stainless steels; factors affecting their corrosion; their behavior in various corrosive environments, marine and industrial atmosphere, in organic and inorganic acid salt solutions and in halogen salts and weak and strong bases; and the preferred practice in construction and use of stainless steels. It is shown that nickel in combination with chromium increases the corrosion resistance in both oxidizing and reducing solutions. In addition it has desirable effects in promoting austenitic structure and maintaining it during and following fabrication.

★ ★ ★

International Nickel, Dept. EZ, New York 5, N. Y.



MOSSBERG PRESSED STEEL CORP.

OFFERS: BALANCED PRECISION REELS

in HEAVY DUTY construction for use on modern HIGH SPEED wire drawing machines.

To provide higher operating efficiency, with the ever increasing tendency towards the drawing of finer gauge wire on larger reels at higher speeds, the following reel requirements are now essential.

(1) PROPER PROPORTION
(2) BALANCE
(3) ACCURACY
(4) STRENGTH
(5) DURABILITY

All these requirements are incorporated in spools and reels made by

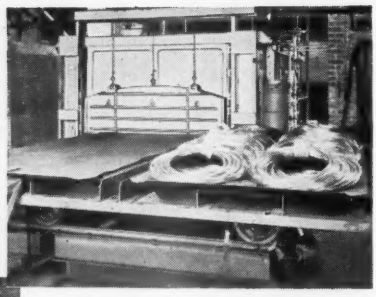
MOSSBERG PRESSED STEEL CORP.

18 WEST STREET ATTLEBORO, MASS. U. S. A.

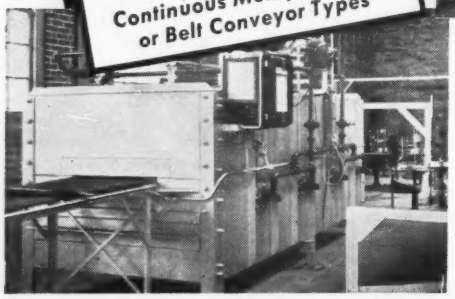
Telephone Attleboro 1-0847 & 1-0848 #101

ROCKWELL FURNACES

Gas · Oil · Electric
Direct·Muffle·Atmosphere
Batch Pan—Car—Pit or Hood Types
Continuous Multiple Strand or Belt Conveyor Types



Gas-fired, atmosphere controlled, pan type batch furnace for annealing brass wire in coils.



Gas-fired furnace for bright annealing steel, stainless steel and non-ferrous wire running continuously through tubes in furnace.

ROCKWELL ALSO BUILDS { *Coil winding machines, reels and spools; pickling, brushing, cleaning, washing, finishing, drying and handling equipment; ovens and dryers; special fabrications; non-ferrous rod mills.*

ROCKWELL SINCE 1888 BUILT

FURNACES · OVENS · SPECIAL MACHINERY

W. S. ROCKWELL COMPANY

242 ELIOT STREET · FAIRFIELD, CONN.

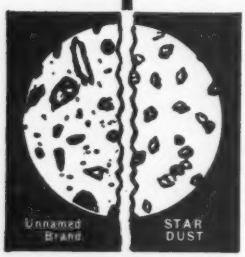
In Canada: Francis Hankin & Co., Ltd. Montreal & Toronto

You're LAPS AHEAD with ACE Star Dust

DIAMOND LAPPING COMPOUNDS AND DIAMOND POWDERS

Laboratory Grading Does it!

MIRROR FINISHES IN MINUTES ON DIES, TOOLS, MOLDS AND PRECISION PARTS



ACTUAL MICROPHOTOS PROVE STAR DUST SUPERIORITY AT A GLANCE . . .

STAR DUST is so accurately crushed and graded by Ace's new laboratory method that it achieves uniform nodular shape, permitting all particles to work. Thus you are assured finishes of less than half a micro inch, quicker than ever before. By contrast, note lack of uniformity and the flats in the "unnamed" brand that prevent accurate finishing!

● STAR DUST USERS REPORT AVERAGE SAVINGS IN POLISHING TIME OF MORE THAN 78%: Available in ophthalmic-tipped tubes or in new applicator gun that delivers minimum quantities to individual jobs and eliminates all waste . . . In all grit sizes as fine as .0001".

Delivery from stock in most sizes!

Write today for informative bulletin No. D-6

ACE ABRASIVE LABORATORIES | 250 WEST 57th STREET NEW YORK 19, N. Y.

Metal Working Waxes Described in Booklet

The story of Johnson's Wax lubricants and their new uses in the metal working industry is told in a 20-page booklet just issued by the company.

★ ★ ★

The illustrated booklet outlines the basic requirements for good lubrication and lists the many types of operations in which wax lubricants have been found to be ideal.

★ ★ ★

Five lubricant products are marketed by Johnson's, each developed for a specific job. The company also markets a machine cleaner. All are described in the booklet, along with methods of application. These products are now being widely used in American industry for drawing and forming, impact extrusion, cold heading, drilling, reaming, piercing, blanking, cutting, sawing, routing and many other operations. Marked savings in labor, materials and tools have been reported.

★ ★ ★

The booklet can be obtained by writing to **S. C. Johnson & Son, Inc.**, Racine, Wis.

Fansteel to Increase Facilities

A contract to expand production of vitally needed columbium and tantalum has been negotiated by the Defense Materials Procurement Agency with the **Fansteel Metallurgical Corporation**, North Chicago, Illinois.

★ ★ ★

Under terms of the contract, Jess Larson, Administrator of DMPA, said the company at its own expense has agreed to expand production facilities at its North Chicago plant at an estimated cost of $455,280 to step up its output of potassium tantalum fluoride to approximately double the present capacity. This tantalum fluoride is the basic material from which tantalum metal is produced. In addition, Fansteel will recover columbium oxide from low-grade ores and residues.

★ ★ ★

In return, the Government guarantees a market for that portion of the production which is not required immediately for defense purposes. The life of the contract is for five years.

★ ★ ★

A NAME YOU CAN DEPEND ON!

In these days of highly complex cable coating requirements, a dependable source of supply is important!

That's why more and more U. S. wire manufacturers are turning to the firm that specializes in producing lacquers for the insulated wire industry—the New England Lacquer Company.

Our technical specialists are ready to work with you at any time—to help solve *your* lacquer problems. Write for details!

The adove photograph is one of many contained in an eight-page brochure describing our facilities to serve you. Write for your copy of the complete brochure.

NEW ENGLAND LACQUER CO.
150 KING PHILIP ROAD
EAST PROVIDENCE, R. I.

Columbium is an alloying element used in the production of superalloy steels required to resist the high temperatures developed in jet aircraft engines. Tantalum, the sister element to columbium, is also used for special alloys and in the manufacture of electronic devices, which are indispensable for military uses.

★ ★ ★

The U. S. is largely dependent upon foreign production for its supply of columbium and tantalum minerals, chiefly Nigeria and the Belgian Congo.

★ ★ ★

Both metals are currently listed by the Defense Production Administration as being in short supply.

Higher Capacity Thread Roller

An increased capacity automatic thread roller, model A-312-H, is announced by Hartford Special Machinery Co., 287 Homestead Ave., Hartford 12, Conn. The machine rolls screws from size six to 5/16-inch diameter and thread lengths up to 2½-inch. Production rates are 80, 100, 120 and 140 pieces per minute, depending on size of screw being rolled. Standard die dimensions are 15/16-inch thick and 5 inches long for the moving die and 15/16-inch by 4¼ inches for the fixed die.

★ ★ ★

After rolling, the screws are ejected automatically into a funnel that leads to a portable receptacle in the rear of the machine. Unloading is done manually. The machine is powered by a 5-hp motor with starting switch and automatic cutout for overload safety.

New Surface Tension Measuring Instrument

Joseph B. Kushner, electroplating engineer, 115 Broad St., Stroudsburg, Pa., has issued a 4-page leaflet describing the Sur-Tan Meter, a simple and practical instrument to enable anyone to make quick and accurate surface tension measurements under production conditions. While designed especially for the electroplating industry, it has been found to have many other applications—in acid pickling, enameling, anodizing and so forth.

★ ★ ★

The leaflet will be sent to those who may want to have information on it.

S. A. ETECO

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(BELGIUM)

Selling Office for
Tréfileries León Bekaert,
S.P.R.L.

STEEL WIRES

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NO CMP REQUIRED

Submit your
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To The
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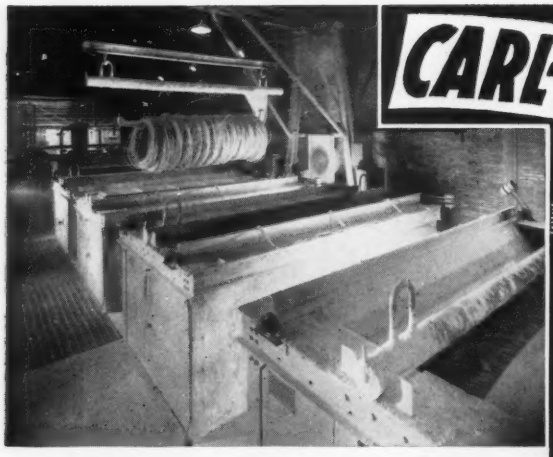
NEW YORK 1, N. Y.



CARL-MAYER

HI-SPEED REGISTERED

ROD BAKERS

PATENT Nos. U.S.A. 2,235,559 2,296,361 2,323,828 CANADA 396,144 401,589

ALSO OTHER TYPES OF INDUSTRIAL OVENS AND FURNACES

GREATER SPEED AND FUEL ECONOMY PROVES OUTSTANDING ENGINEERING

Cari-Mayer Hi-Speed Rod Bakers have an exclusive heating arrangement, combining faster baking with amazing fuel economy — and a patented Blow-Off feature which removes moisture without bumping or agitating the coils. *WRITE FOR BULLETIN NO. 350.*

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Atlantic Wire Co.
Atlas Steel Co.
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Canadian Steel Corporation.
California Wire Cloth Corp.
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Crucible Steel Co. of America.
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Pittsburgh Tool Steel Wire Co.
Republic Steel Corp.
Steel Co. of Canada

THE CARL-MAYER CORPORATION

3030 EUCLID AVENUE
CLEVELAND, OHIO

AETNA-STANDARD WIRE DRAWING UNIT

- DESIGNED FOR COMPLETE VERSATILITY
- BUILT FOR SAFE, EFFICIENT PRODUCTION
- SINGLE OR MULTI-DRAFT OPERATION
- INTERCHANGEABLE UNITS AND PARTS
- AUTO-RHEOSTATIC SYNCHRONIZATION
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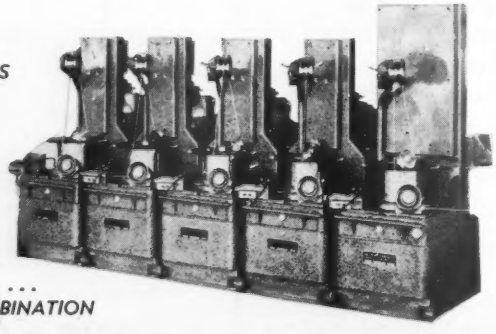
FERROUS OR NON-FERROUS

WET OR DRY LUBRICANTS



SINGLE UNIT ... OR ANY COMBINATION

THE AETNA-STANDARD ENGINEERING CO.

PITTSBURGH, PA.

ASSOCIATED COMPANIES: HEAD, WRIGHTSON & COMPANY, LTD., THORNABY-ON-TEES, ENGLAND
AETNA-STANDARD ENGINEERING COMPANY, LTD. . . . . TORONTO, ONTARIO, CANADA

Nopco Announces New Series of Drawing Compounds

A new series of alkaline drawing compounds for wet drawing non-ferrous wire, rods and tubes has been developed by the **Nopco Chemical Company**, Harrison, New Jersey.

★ ★ ★

Called the Durpon Series, these improved drawing compounds are said to lengthen die-life and lower drawing costs through optimum lubrication over a longer period of time.

★ ★ ★

Incorporated into each of the Durpon compounds is a stabilizing additive which prevents contamination of the effective drawing ingredients. This preserves the stability and lengthens the life of the drawing emulsion during recirculation.

★ ★ ★

For additional information, write to Dept. NS, Nopco Chemical Company, Harison, New Jersey.

W. S. Tyler Co. Honored

The W. S. Tyler Co. of Cleveland, Ohio, manufacturers of wire mesh, was honored at the recent Community Chest Plaque Award dinner held annually by the Chest's Commerce and Industry Division. **William Murphy** accepted the plaque on behalf of the company from **Fred M. Asbeck**, divisional chairman. The award was presented to a total of 138 Cleveland companies and other organizations having 90% employee participation in the 1951 Cleveland Chest campaign, and showing an average of at least a $7. gift per donor. Guest speaker, Alvin Sutton, City of Cleveland Safety Director, addressed the meeting on the role of Red Feather agencies in reducing crime. Cleveland, pioneer in the Community Chest movement, started this annual award presentation last year.

"High Corrosion Resistance Gives Nickel Plated Metals Wide Range of Uses"

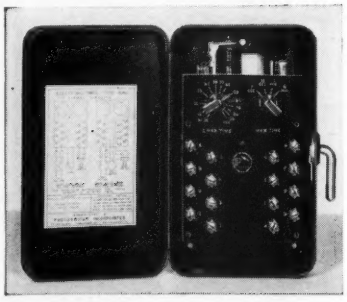
A 4-page pamphlet in which is pointed out that nickel plating can often be the economical answer where service conditions do not justify use of solid corrosion resistant materials, because of nickel's good corrosion resistance to a wide

variety of products. Various industrial examples show nickel successfully plated on cast iron, steel, bronze and copper equipment. Deposits as thin as 0.003 and as thick as 0.080 inch prevent product contamination and equipment deterioration and reduce maintenance. **International Nickel,** Dept. EZ, New York 5, N. Y.

Electronic Timer

Photoswitch Electronic Timer Type 30HL1 makes available to industry for the first time, a timing control with great flexibility, accuracy and dependability. It is recommended where long life repeat-cycle operation or precise accuracy is a prerequisite.

★ ★ ★



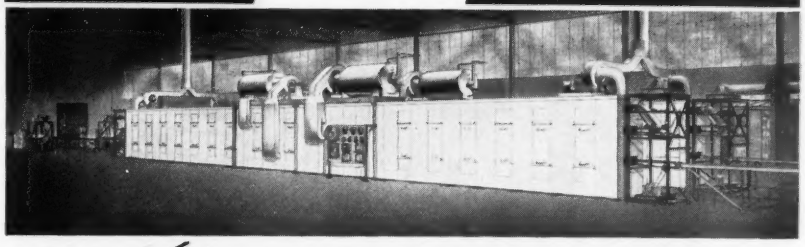
Type 30HL1 is an automatic timer for intervals from 1/20 second to four minutes. It provides four basic types of timing: **Interval, delayed action, automatic repeat, and programming,** as well as many variations of these four fundamental types. All these timing combinations are incorporated in this one timer and may be utilized by merely changing external connections to the terminal board. Thus type 30HL1 is a universal timer.

★ ★ ★

The electrical circuit of Photoswitch Timer Type 30HL1 has many exclusive features. Foremost is the extreme flexibility of the entire unit, which has been designed to provide in a single timer the four fundamental types of timing. The basic electronic circuit is self-compensating for changes in line voltage and, for this reason, accuracy does not vary from day to day—nor will replacement of the vacuum tube after the original 2% limit of accuracy. Even low line voltages do not affect

CARL-MAYER WELDING ROD OVENS

PATENT NOS. 1,843,430 2,373,325



One of Several Carl-Mayer Ovens at Hollup Corp.

FAST, EFFICIENT AND ECONOMICAL DRYING OF COATED WELDING RODS.

Only in Carl-Mayer Ovens can you obtain the combination of the recirculating gas fired air heater principle and the "Mayer" patented rod transfer system — two highly important features in ovens of this type.

We also build other types of industrial ovens and furnaces. Carl-Mayer installations are backed by reputation for unusual performance, and over 30 years' experience.

WRITE FOR BULLETIN NO. 350

THE CARL-MAYER CORPORATION

3030 EUCLID AVENUE
CLEVELAND, OHIO

NORBIDE® Abrasive: *Effective, Economical*

NORBIDE Abrasive, made of Norton Boron Carbide, is second only to the diamond in hardness — *but 150 times less expensive!* It will effectively cut and semi-finish wire drawing dies, particularly those made of the hard cemented carbides.

Write for Catalog No. 559-W

NORTON COMPANY
Worcester 6, Mass.

NORTON *Making better products to make other products better*

7 out of 9

WIRE MILLS

that Liquor Finish Wire

use STANNOUS SULFATE *because*

Tin Losses Are Reduced . . .

by elimination of high tin sludging due to incomplete reaction in feather tin method.

Results Easier to Control . . .

only two variables to watch — Stannous Sulphate and Copper Sulphate — allows immediate, simple color adjustment.

Every Batch the Same . . .

M&T Stannous Sulphate method produces smooth, uniform wire coatings, unvarying from lot to lot.

See how use of M&T Stannous Sulphate can help you save tin in liquor finishing. Write for engineering data.

METAL & THERMIT CORPORATION

Chemical Division

100 E. 42nd St., New York 17, N. Y.

Specialists in Tin and Tin Chemicals

the timer's operation. Although the Type 30HL1 Timer offers wide flexibility, it employs only one vacuum tube and one relay.

★ ★ ★

Type 30HL1 is described in Bulletin PC5010, that may be secured by writing to **Photoswitch, Inc.**, 77 Broadway, Cambridge 42, Mass.

Metallurgical Research Department Established to Serve the Southwest

An upsurge of industrial scientific research in the field of metallurgy has brought about the establishment of a department of metallurgy at **Southwest Research Institute, Dr. Harold Vagtborg**, president, has announced.

★ ★ ★

Appointed to head the department is **Dr. Robert J. Anderson,** who was awarded a Doctor of Science degree by the Massachusetts Institute of Technology, and who has had 35 years experience in industrial, government and educational fields.

★ ★ ★

The department is undertaking industrial metallurgical research in foundry practice, process metallurgy, and physical metallurgy, in addition to problems in metal economics.

★ ★ ★

A non-profit, independent research organization, Southwest Research Institute was established four years ago and is affiliated with the Institute of Inventive Research and the Southwest Foundation for Research and Education.

★ ★ ★

A consulting metallurgist to numerous industrial companies, Dr. Anderson has been a lecturer at the Carnegie Institute of Technology, metallurgical advisor to the Quartermaster's Office and National Production Authority, and manager of the metallurgy department of the Goodyear Tire and Rubber Company and the Goodyear Aircraft Corporation.

★ ★ ★

He is the author of many papers in light metals, corrosion, ferroalloys, metal economics and physical metallurgy.

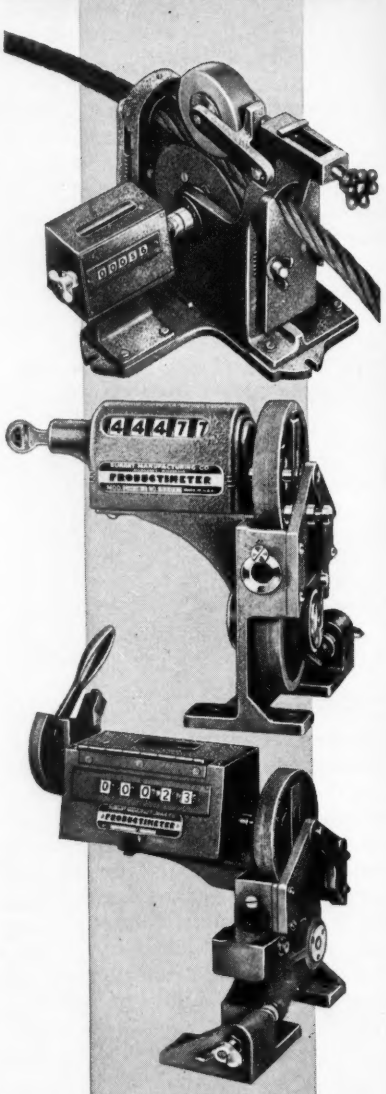
New Condensed Scale Catalog

A new twenty-eight page Condensed Scale Catalog Number 11, has just been released by **The Howe Scale Company**, Rutland, Vermont.

PRODUCTIMETER

WIRE MEASURING MACHINES

Fast . . Accurate . . Dependable . . Legible



Productimeters measure all types of wire from .010 to 1½ inches in diameter . . . at speeds up to 5,000 feet per minute. They eliminate "guess-work" . . . insure profitable operation in your plant.

Send for Catalog No. 40

DURANT MFG. CO.

1918 N. Buffum St. Milwaukee 1, Wis.

118 Orange St. Providence 3, R. I.

Representatives in Principal Cities

PRODUCTIMETERS SINCE 1879 *Count Everything*

NEW

ROOS-

DYKREX

Machinery Catalogue for Finishing Tungsten Carbide Dies

is Ready

Drilling
Finishing
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Special Die Room Equipment

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Send for your copy of this new labor-saving catalog today.

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Carboloy Company
Detroit, Chicago, Pittsburgh
Newark, N. J.

Eastern Carbide Corp.
New Rochelle, N. Y.

Or ask your die room equipment supplier.

Richard F. Straw, Vice President in Charge of Sales, stated that it is a handy reference featuring the most complete line of modern scales for every industrial need. It includes a selection of a thousand popular standard Howe scales weighing from 1/64th of-an-ounce to 400 tons.

★ ★ ★

A compact edition of Howe's complete catalog of 200 pages, the new Condensed Scale Catalog includes complete specifications, spot illustrations and essential information. A simple index makes it easy to find any scale. The Condensed Scale Catalog is conveniently arranged by types of weight indication as Howe is the only company in the industry to offer a complete selection for every weighing requirement. Featured are the famous Howe Scales with beam indication, the exclusive Tape-Drive Dial, unique Weightograph projection and the revolutionary Teleprint Electronic Remote Weight Recorder.

★ ★ ★

The Condensed Scale Catalog also shows a page of Howe Hand Trucks, and a listing of its Branches with sales and service departments throughout the country.

★ ★ ★

For further information, write for a free copy of Condensed Scale Catalog No. 11, The Howe Scale Company, Rutland, Vermont.

★ ★ ★

Special Twin-Hook Crane for One-Man Operation

American Monorail Company, Athens Ave., Cleveland 7, Ohio has developed a new crane that is an application of a 3-ton Electrolift twin-hook hoist mounted between the end trucks of an American MonoRail Crane. The hoist has a lifting speed of 24 feet per minute with a 6 foot spread between hooks. Special anchor type hooks were furnished for quick engagement with the hair-pin hooks carrying a load of wire coils.

★ ★ ★

The Crane is equipped with rubber wheel drive for propulsion on the craneway at 125 feet per minute. All movement is controlled from the push button station in the operators hands. Other advantages than ease

Get Extra Production Without Extra Man-hours... Use

BORAX

● If you're using a lime bath or other compounds for steel wire-stock surface protection, change over to BORAX! This safe, clean, easy-to-handle material is practically dust-free. BORAX, readily soluble in water at working temperature... (190°-200°) eliminates the need for bath solution agitation. Just ONE DIP, which dries quickly in a few minutes, gives an adequate, non-flaking, protective film to rods and wire. This tight, pliable, film of BORAX allows your operator to feed at much faster speeds because of its great affinity for soap lubricants... yet you get longer and more accurate performance from your dies! The film remains on the finished wire as a rust-resistant and is a natural flux. Yes, BORAX has *all* the advantages; use it to get *extra* production!

Here Are The Advantages of Borax-Coated Stock:

- **Compatible with drawing lubricant.**
- **Cleaner to handle in transit.**
- **Remains in better condition...** *an adequate supply can be stored for weeks without reconditioning.*
- **No cleaning of ends necessary before electric butt welding.**
- **Rust inhibited... no oxide film forms.**
- **Can be cleaned most easily.**

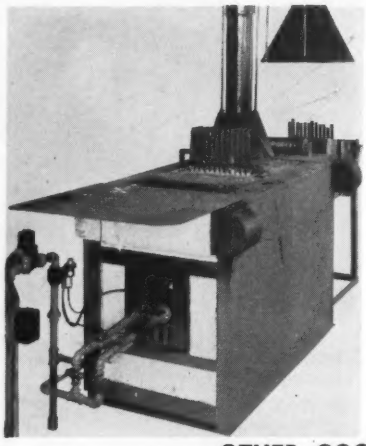
WRITE FOR FULL INFORMATION

PACIFIC COAST BORAX CO.
DIVISION OF BORAX CONSOLIDATED, LIMITED
NEW YORK • CHICAGO
LOS ANGELES • CLEVELAND
PHILADELPHIA

MANUFACTURERS OF FAMOUS 20 MULE TEAM PACKAGE PRODUCTS

12-Head High Speed Tinner

PAY-OFF • FLUX POT • TIN POT • TAKE-UP



HOT TINNING SPEEDS
UP TO
900 FT. PER MIN.

HANDLES WIRE
FROM B. & S. No. 24
THRU B. & S. No. 36

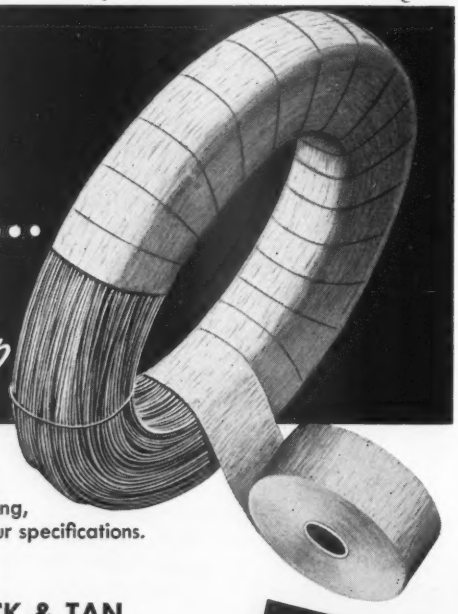
Efficient • Dependable

OTHER COOK EQUIPMENT

- Wire Drawing machines
- Bunchers
- Twisters
- Wire String-Up machines
- Enameling Take-Ups and Pay-Offs
- Enameling machines
- Cabling machines
- Spoolers
- Tinning Take-Ups and Pay-Offs
- Tinning Pots
- Wrapping machines
- Special machinery

COOK MANUFACTURING COMPANY
265 NORTH 9TH STREET **PATERSON 2, N. J.**

for TIGHTER *ALL-ROUND* PROTECTION... use NATCO *Spiral Wrap*



Strong, with a built-in stretch, NATCO's contour-hugging spiral wrap is superior for wire coils, tubing, metal rods and bars. Made to your specifications.

- **PLAIN • WAXED**
- **WATERPROOF • BLACK & TAN**
- **GREASEPROOF • REINFORCED**
- **ANY SIZE ROLL**—*for machine or hand-wrapping*

Write today for sample rolls, prices and complete information.

NATIONAL WATERPROOF PAPERS, INC.
Manufacturers of Protective Papers, Liners and Bags Since 1903
108 Beckett Street, Camden 3, N. J.

If you use a coil wrapping machine, we can supply special tension and edge-folding attachments.

of handling include minimum space requirement; efficient use of tank capacity and elimination of damage to tank lining.

New Metal Cleaning Folder by Houghton

An informative, summarized 6-page bulletin on metal cleaning, including concentrations for various cleaning applications and a handy, streamlined list of cleaners for general industrial use, has been released by **E. F. Houghton & Co.**, of Philadelphia, makers of Houghto-Clean and Cerfak metal cleaners.

★ ★ ★

This bulletin briefly describes the recommended uses of each of Houghton's alkaline, emulsion, acid phosphate and surface active agent types of cleaners. For a free copy of the "Metal Cleaners" folder, write to E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

New Bulletin On Direct-Fired Heat Treat Furnaces

A new bulletin on direct fuel-fired furnaces for all types of heat treat processing has just been released by **Surface Combustion Corporation**, Toledo, Ohio.

★ ★ ★

Practical applications of direct fuel-fired batch and continuous furnace designs in the ferrous and nonferrous industries are shown, and basic operating data given for each of these typical examples.

★ ★ ★

General information is also included on the possible applications of convection heating and the utilization of auxiliary materials handling systems.

★ ★ ★

Copies of Bulletin SC-156 are available by writing direct to Advertising Department, Surface Combustion Corporation, Toledo, Ohio.

Spring Maker to Expand

Comfort Spring Corp., Baltimore, maker of bed and box springs, will start work shortly on erection of an addition to its plant at Hollins Ferry Road and the Baltimore & Ohio Railroad. The addition is expected to be in operation within a year.

REELS **SPOOLS**

ALL SIZES

WOOD-PLYWOOD-WOOD-METAL

RETURNABLE NON-RETURNABLE

Samples and Prices on Request

DURKEE MFG. CO. **PINE RIVER, MINN.**

Speed Nuts Produced In Canadian Plant

A new plant for the manufacture of Speed Nut fasteners in Canada was formally opened in May by **Dominion Fasteners, Ltd.**, in Hamilton, Ontario.

★ ★ ★

Dominion's new plant will supply Canadian industry with more than 100 million nuts annually.

★ ★ ★

Participating in opening ceremonies was George A. Tinnerman, president of Dominion Fasteners, Ltd., and vice president and general manager of Tinnerman Products, Inc., Cleveland.

★ ★ ★

He revealed that Tinnerman Products last year had record sales of more than 1,500,000,000 fasteners. He pointed out the rapidity with which Tinnerman had become a major factor in the fastener industry and predicted that the Canadian licensee would grow with equal speed.

★ ★ ★

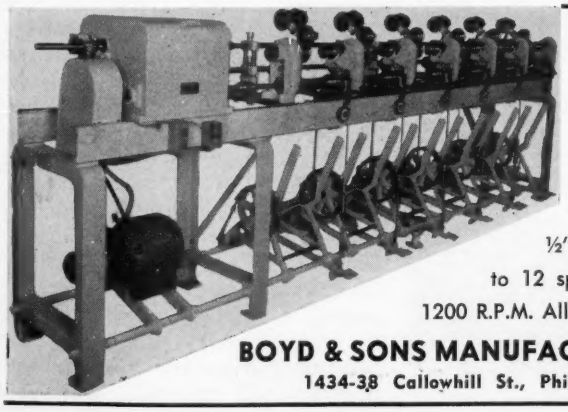
The new plant is the first unit of a planned expansion which is expected to occupy 40,000 square feet of space on a six-acre site. It is of ultra-modern construction with buff brick exterior and is designed for expansion without requiring the moving of existing machinery.

★ ★ ★

The plant will be operated under the direction of **F. A. Knight**, vice president and general manager of Dominion Fasteners, Ltd.

Made Executive Vice President of Bridgeport Brass

Austin R. Zender, formerly vice president of sales, was recently elected executive vice president, **Bridgeport Brass Co.**, Bridgeport, Conn., and **Stanley Z. Bronner** was promoted from assistant treasurer to assistant vice president and assistant controller. **Warren J. Faust**, has been moved from controller to vice president and controller, and **Carl P. Quanz** to vice president and assistant controller. Mr. Quanz served as manager of the Indianapolis plant, a position he retains.



BOYD'S NEW MULTI - HEAD SPOOLER

Winds wire on spools up to 10" in diam. Traverse of ½" to 8". Made with 1 to 12 spindles. Speeds up to 1200 R.P.M. All parts precision made.

BOYD & SONS MANUFACTURING CORP.

1434-38 Callowhill St., Philadelphia 30, Pa.

H-D

BUNCHING

(TWISTING)

AND

STRANDING

IN THE WIRE AND GENERAL MANUFACTURING PROCESSES

SPECIALIZED ENGINEERING

AND

SPECIALIZED FACILITIES

AT YOUR SERVICE

Expanding application of twisting principles to the production of many products is reflected by an ever-increasing demand for both H-D standard equipment as well as machines especially engineered to solve varied production problems. Week after week surprising new uses are developed through the close cooperation of our engineering department with manufacturers in many fields.

Write today for our New Technical Bulletins. Tell us what you make—or contemplate making and your inquiry will receive prompt attention.

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MACHINE CO., INC.

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PA.

fewer REJECTS — faster PRODUCTION
with Cortland Brand WIRE

There'll be fewer rejects or production stoppages when you use Cortland Brand Wires. From one end to another, these specialized low-carbon wires are noted for their uniform quality. They're made from finest corrosion-resisting steel, drawn in Wickwire Brothers' own mills. Choose Cortland Brand Wires for all your products — in any of these finishes, types and sizes.

FINISH Plain, galvanized, coppered or tinned.

TYPE Stone wire, bookbinder, merchant trade, manufacturers and market, fine and weaving, etc. Coils, spools or straightened and cut to length.

Cortland BRAND
WICKWIRE BROTHERS, INC., Cortland, N.Y.

PLYWOOD REELS and SPOOLS
Engineered to Your Particular Requirements

Manufacturers and designers of all types plywood reels and spools for *insulated wire, bare wire, rope and cable.* Used by leading manufacturers. Prompt quotations.

Consulting service and samples free to prospects and customers.

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156 NORTH MAIN STREET TELEPHONE 2125
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WE BUY WE SELL

We Pay Highest Prices for Used Machinery
One NEBCO 7-WIRE STRANDER
(18" x 10" SPOOLS IN CRADLES)
54-Inch TAKE-UP STAND
Complete With
20-HP SLIP-RING MOTOR and CONTROLS
All Machines Reconditioned in Our Own Shop

WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

HEANIUM® WIRE GUIDES

FOR BETTER *PROVEN* PERFORMANCE AND LONG LIFE
Send for Detailed Information
HEANY INDUSTRIAL CERAMIC CORP.
NEW HAVEN 3, CONN.

New Technical Data Sheet on Tachometers

The Metron Instrument Company, 432 Lincoln St., Denver 9, Colo., announces a new Metron Technical Data Sheet No. 42P (revised).

★ ★ ★

It describes Tachometers for speed measuring applications where a wide range of speed measurement is desired in a continuously indicating switchboard instrument.

★ ★ ★

Typical applications include acceleration test stands, turbine tests, aircraft component tests, process control, dynamometer test stands, motor test stands, wherever a wide range of speeds are measured.

★ ★ ★

It is available to our readers by writing direct to the company.

Elect Maxwell Vice President American Ordnance Association's N. Y. Post

R. L. Maxwell, Major General, U. S. Army (ret.), vice president in charge of personnel and public relations of **American Machine and Foundry Company** has been elected a vice president of the American Ordnance Association's New York post.

★ ★ ★

General Maxwell has been a director of the New York Post for several years. He was national secretary of the AOA in 1925 and 1926 and editor of the Association's magazine "Ordnance" in the same period.

Plume and Atwood Appoints New Sales Manager for Thomaston Mill

Harry A. Rowe, of Toilsome Hill Road in Fairfield, Conn., has been appointed sales manager for the **Thomaston Division** of the **Plume & Atwood Manufacturing Company**. This division produces brass sheet, strip, rod, wire, and platers' materials.

★ ★ ★

Thomas I. S. Boak, president of Plume & Atwood in announcing that Mr. Rowe's appointment would be effective May 26th said "I'm confident that the more than twenty years experience that Harry Rowe has in the sales and merchandising of brass mill products, will mate-

rially strengthen the Plume & Atwood Mill sales program."

★ ★ ★

Mr. Rowe is a native of Bridgeport, where he secured his formal business training and education. During World War II he served as Assistant Chief of the Copper Division of the War Production Board in Washington. To serve in this capacity he left the Bridgeport Brass Company where he had been New England sales representative. Shortly after VJ Day, Mr. Rowe returned to New England as sales representative for the Western Brass Mills at the Winchester Repeating Arms Company Mill in New Haven. For the past four years he has been district sales manager for the Bridgeport Rolling Mills.

★ ★ ★

Pennsalt Makes Ott Head of New Division

The Pennsylvania Salt Manufacturing Company has organized the Investment Analysis Division and has named **Edwin M. Ott** manager.

★ ★ ★

The new division has the responsibility of analyzing all economic factors and reporting on profit possibilities of projects which will require capital investment.

★ ★ ★

Formerly these responsibilities were carried out in the Market Research Division, headed by George T. Collins, who recently was elected Assistant to the President. In the past year these activities and others centered in the Market Research Division have expanded and the market research and development aspects recently were transferred to the Sales Division. Mr. Ott has been connected with Pennsalt's market research and investment analysis activities since returning to the company after the war.

Patronizing Our Advertisers

These are the progressive concerns who stand behind their products and have reputations worth sustaining and you can depend upon them.

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes

In Over 100 Sizes, Polished and Tinned, from .0015" to .359" in dia.

Aluminum — Annealed — Belt Lacing — Brass, Soft and Spring — Copper, Bare and Tinned Coppered Steel Spring — Galvanized — Tinned
Monel — Nickel Silver — Pure Soft Nickel — Oil tempered, Steel Spring, Black Finish Phosphor Bronze, Spring Temper — Picture Wire — Iron Wire, Pure — Resistance Wire, Hoskins Chromel "A" — Stainless, Soft and Spring Temper — Tag Wire, 1000 in an Envelope — Florist Wire — Spooled and Coiled, ¼-½-1-5#

Wires Straightened and Cut to length — Small Gauges — Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless. Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.

THE MALIN & COMPANY

2514 Vestry Ave. Established in 1884 **Cleveland 13, Ohio**

TUNGSTEN CARBIDE WIRE DRAWING DIES

DESIGNED FOR LONG LIFE AND MAXIMUM WIRE PRODUCTION

Furnished semi-finished to within .001" to .002" of finished size at rough-drilled die prices. Require only light sizing and polishing before using. Our dies embody special design features that make for superior performance.

Also, a full line of carbide tooling for the Cold Heading Industry

EASTERN CARBIDE CORPORATION

NEW ROCHELLE, N. Y.

***Buy the Best:* MONTGOMERY SILVER-COATED COPPER WIRE**

Hard or Annealed—on spools.
Suitable for: Hookup Wire—Radio Frequency Cables—Circuit and High Temperature Wires—as specified by the Armed Services—and others.

WRITE FOR DETAILS

Also makers of Bare Tinsel Conductors

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Cut Your Product Cost . . .!

Stop struggling with wire worries. There's a Continental wire to help cut product costs—to add sales appeal. Let us know about your problem . . . Let Continental's helpful wire service work for you.

CONTINENTAL STEEL CORP. STEEL CONTINENTAL WIRE KOKOMO, IND.

*Trade Mark Reg. U. S. Pat. Off.

CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's* Wire in many sizes, shapes, tempers and finishes, including Galvanized. KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

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- Creped to s-t-r-e-t-c-h wraps to protect against rust, moisture, oil, or abrasion.
- Proven vapor method that stops rust without slushing . . . Angier VPI ® Wrap.
- Machines, devices for spiral wrapping.
- Installation and service at no charge.

FREE — Spiral Wrap Booklet — FREE
Angier Corporation, Framingham 3, Mass.

ACP Files Infringement Suit

American Chemical Paint Company, Ambler, Pennsylvania on May 1, 1952 filed civil suit No. 12609 against Octagon Process, Inc., 15 Bank Street, Staten Island 1, New York in the U. S. District Court for the Eastern District of New York for alleged infringement of one of its phosphate coating patents, U. S. Patent 2,121,574 claiming that the manufacture and sale of Anchorite 100 by Octagon Process, Inc. constitutes an infringement of American Chemical Paint Company's patent.

Catalog on Air Conditioning, Cleaning and Handling

A 60-page catalog of Westinghouse-Sturtevant products for "putting air to work" is now available from the **Westinghouse Electric Corporation.**

★ ★ ★

The two-color General Product and Application Catalog is divided into three sections: one, a 21-page equipment section; two, a 14-page "putting - air - to - work" application section; and three, a 16-page engineering data section.

★ ★ ★

A "Quick-Finder" chart greatly simplifies the problem of selecting the right piece of equipment for the job: it does this by cross-indexing equipment performance and job requirements. On the same page is a "Quick-Finder" index integrated with the "Quick-Finder" chart.

★ ★ ★

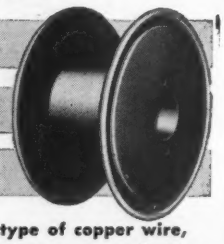
Section one—the equipment section—is the most complete and up-to-date set of condensed specifications, dimensions, and descriptions of Westinghouse-Sturtevant products yet published. Section two—the well illustrated, application section—tells how to put air to work by relating equipment capabilities to the job requirements. Section three—the engineers data section—is a collection of tables, charts, and useful data that can be used to determine the correct Westinghouse-Sturtevant product for a given job of air handling, air conditioning, and air cleaning.

★ ★ ★

For a copy of this catalog, Catalog 600, write Westinghouse Electric Corporation, Box 2278, Pittsburgh 30, Pa.

Apco...

SPOOLS
REELS
BOBBINS



. . . for every type of copper wire, steel wire and wire rope application.

Leader in the industry for more than 50 years, Apco Mossberg has manufactured almost every conceivable kind of steel spools, reels and bobbins. Contact us for free engineering service — we will be glad to offer suggestions and solutions to *your* particular problems. Write today for our illustrated booklet.

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LIME
for
WIRE DRAWING

WARNER COMPANY
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BELLEFONTE, PA.
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Philadelphia—Pittsburgh—New York

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FERROUS and NON-FERROUS
COPPER • BRASS • LOW BRASS
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SILVER • PURE NICKEL • MONEL •
STEEL TINNED • BRUSH (all metals)
and "twisted" wires.
Specialists in BRUSH WIRE and wires for weaving.

All types of Ferrous and Non-Ferrous wires for filters, screens, brushes, weaving, etc., down to the smallest diameters—*in all metals.*

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For electric wire. Acetate, nylon and silk, natural or dyed. Put up on braider tubes, spools or cops.

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FRANK LUNDAY
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Top quality non-returnable spools . . available in standard head and barrel sizes.

Write for a quotation today!

MASON CAN COMPANY
1949 Dexter Rd., East Providence 14, R. I.
MASON CAN COMPANY OF OHIO
Greenville, Ohio

New Tensolon Hi-Temp Wire Features Perfect Concentricity and a Tougher, More Flexible Covering

Tensolite Insulated Wire Company of Tarrytown, New York, announces production of a new miniature wire featuring an impervious fused insulation with high dielectric strength and a higher temperature rating.

★ ★ ★

These new wires, designated by the manufacturers as Tensolon, are the only miniature wires using the patented tensulation process with tetrafluoroethylene (Dupont Teflon) in the form of multi-wrapped and fused tape. This combination prevents the formation of pinholes or other irregularities caused by "plastic-memory".

★ ★ ★

In operation, temperatures up to 250°C have no deteriorating effect on Tensolon's tough high dielectric covering. Chemically inert and non-inflammable, Tensolon insulation is recommended for its extra dependability and longer service life under the severest operating conditions.

★ ★ ★

For sampling purposes, the manufacturer has made 100 foot rolls available in any of the several Tensolon constructions at $12.50 per roll.

★ ★ ★

For complete data on new Tensolon high temperature wires, readers are invited to write for latest illustrated literature to Tensolite Insulated Wire Company, 196 Main Street, Tarrytown, New York.

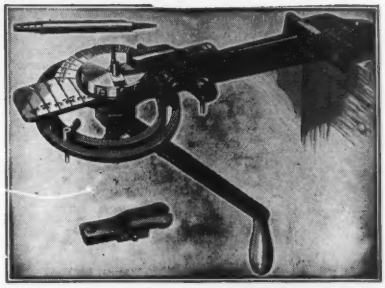
Ransom Cooper, Jr. and H. D. Tietz Appointed Managers of Inco's Sales Departments

Ransom Cooper, Jr. has been appointed Manager of the Nickel Sales Department and **H. D. Tietz** Manager of the Inco Nickel Alloys Department of **The International Nickel Company, Inc.**

★ ★ ★

Messrs. Cooper and Tietz will function under Walter C. Kerrigan and L. R. Larson, who as General Sales Manager and Assistant General Sales Manager, respectively, are responsible for both primary nickel and mill product sales of the company.

KILMER WIRE FORMER



- Forms Eleven Sizes of Eyes from Flat, Round, Square or Half-Round Stock, also Almost Any Shape Desired
- Adjustable for No. 8 to No. 21 Gage Wire

The cut on right shows a few of the thousands of the forms made on this WIRE FORMER

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METAL BOUND RETURNABLE REELS

Made in 12" to 24" diameters.

No nails used. *All glued construction.* Made of kiln-dried wood. Special design prevents breaking or splintering of wood, protecting insulated wire from damage.

Write for details

WILLIAM McCASKIE, INC.
FORGE ROAD • WESTPORT • MASS.
Tel.: 145 Est. 1903

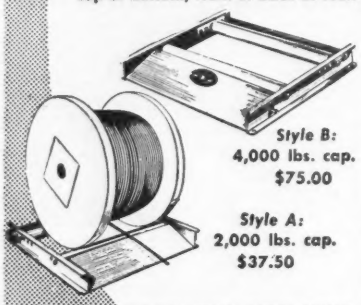
Reels Just Go Rollin' Along To Job Or Storage

Why push, shove, pull or rely on jacks when the most efficient way is to use

ROLL-A-REEL

It's husky, long-lived, easily carried to reels, job or storage. The low slanted front and positive front lock insure quick loading or unloading.

Remove wire, cable or rope from top or bottom, front or back of reel.



Style B: 4,000 lbs. cap. $75.00

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• PROMPT DELIVERY: ORDER NOW!

ROLL-A-REEL

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PORTER CARBIDE-EDGED CUTTERS

for extremely hard materials, including stainless steel.

Stand up under the hardest usage. Tough carbide edges firmly brazed to cutting jaws. Excellent for extra hard materials like stainless steel rods, wires, pins, etc. #3 cuts to 5/16" diam. #4 cuts to 3/8" diam. Pay for themselves many times over!

ORDER THROUGH YOUR INDUSTRIAL SUPPLY HOUSE

H. K. PORTER, INC., Somerville 43, Mass.
Manufacturers of PORTER CUTTERS, PORTER PRUNERS and PORTER-FERGUSON Auto Body Fender Repair Tools

Coating Metal Used in Hot-Dip Galvanizing

(*Continued from page* 578)

Aluminum, especially when there is no lead in the galvanizing bath, can cause much trouble in small centrifuge work by thickening up the bath and causing the articles to stick together in large lumps. It can thus be seen that the intelligent use of metals and alloys in the coating for galvanizing, if used in small amounts, and in the correct proportions, can be extremely valuable, especially from the sales standpoint of high quality finish, and developing a beautiful spangle, or a bright smooth coating on non-spangled articles. There are times when aluminum serves an excellent purpose in galvanizing baths. On the other hand, too much aluminum can cause scruf and dirt and oxide in the coating.

★ ★ ★

Tin and cadmium on the other hand, thin out the bath, give a fine powdered oxide on the bath, and when used in the right amounts are very beneficial from all standpoints. The correct use of small amounts of metals and alloys can greatly improve operating conditions, can reduce dross production, can reduce the metal used per ton of product, can greatly improve the finish on both sheets, and sheet metal ware, and can be extremely valuable in setting up the best operating conditions for centrifuge work. It pays well also to purchase high cadmium zinc once in a while because this kind of zinc is purer, contains lower iron, and its high quality improves operating conditions generally. So the first cost is not nearly as high when the overall benefits are known, and taken into account.

★ ★ ★

Cable Knitting and Its Advantages

(*Continued from page* 583)

cover some 1,200 feet of the same cable, an increase of 500%. While some manufacturers claim up to 15 times greater production, there is no doubt that the increased production is considerable, due to the general design that makes possible the

RECLAIM YOUR DIAMOND POWDER

with

NATIONAL RESEARCH CO'S.

new and exclusive process. This process is more efficient and recovers higher percentages of greater purity of used diamond powders.

Diamonds from worn grinding wheels, grinding wheel sludge and dust, cotton charged with powder used in die polishing, die washings and diamond bearing scrap — all

RECLAIMED SUCCESSFULLY

Don't waste diamond bearing materials — they're valuable.

Send it to

NATIONAL RESEARCH CO.

25530 Little Mack Avenue

St. Claire Shores, Michigan

SMALL WOOD SPOOLS

for

WIRE

Range of Sizes:

1" long with 3/4" head diam. up to 3½" long with 2⅛" head diam.

Supplied stained in any color according to your needs. Special finishes to order.

"NOWASCO" WOOD SPOOLS are used by many wire manufacturers for wire prepared for retail sale.

Write for samples and prices.

NORTH WATERFORD SPOOL CO.

P.O. Box W
North Waterford, Maine
Tel.: Harrison 96-2
1918—1952

incorporation of the features already discussed.

★ ★ ★

Reduced labor costs are a factor which greatly enhance the attractiveness of knitting machines. Taking an average increase in production of ten times that of the braider, it follows that 100 braiders will be required to equal the production of ten knitting machines. Thus, a force of five attendants could be reduced to a single operator since, not only is the knitting machine singularly free from mechanical troubles, but it is equipped with an automatic control that stops the machine should an end of yarn break or some other fault develop. This device is usually actuated by low voltage knock-off circuit which stops the motor when the safety circuit is closed, putting the lost time at a minimum. There is no need to turn the machine back to piece up with the fractured yarn as on a braiding machine, as the broken yarn can be almost carelessly thrust into the needle box where it finds its own needle, and there will be no visible sign of a fault.

★ ★ ★

Apart from the above operating advantages, the question of capital outlay should be considered. Basing this on the former example of production comparison, the expenditure would be at least 50% greater on braiding machines and, of course, the maintenance charges are considerably heavier. The latter is due to the greater number of moving parts on a braiding machine and the heavier duty to which they are subjected.

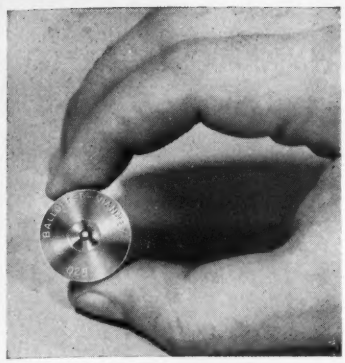
★ ★ ★

It must be acknowledged that, where the knitted cover is permitted, the advantages of the knitting machine are many and obvious. It would seem to be only a question of time before these advantages become more widely recognized.

★ ★ ★

Send in
Your Order Now
for the
1952 Wire Buyers Guide

BALLOFFET VIANNEY WIRE DIE CO., Inc.



All sizes from .081" down to .0004" in stock from New York.

Manufacturers of
Quality diamond dies since 1870

BALLOFFET VIANNEY WIRE DIE CO., Inc.
6825 ADAMS ST., GUTTENBERG, N. J.
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DIAMOND DIES
.000's to .102"
For many years . . .
Outstanding in quality,
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EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
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DIAMOND AND CARBIDE WIRE DRAWING DIES
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Diamond Dies
Guaranteed Perfect for
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QUALITY HIGH — COST LOW
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Diamond Dies for Wire Drawing
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DIAMOND WIRE DRAWING DIES
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Fort Wayne, Indiana

STANDARD UNI-DRIVE WIRE WINDER
WILL INCREASE YOUR PRODUCTION
Write for details.
STANDARD MILL SUPPLY
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WOOD REELS and SPOOLS
AMERICAN WOODWORKING COMPANY
1" to 60" Diameters
OVER 50 YEARS EXPERIENCE
1674 No. Lowell Avenue
Chicago, Ill.

'Surface' HEAT TREATING FURNACES
For Ferrous and Non-Ferrous Wire.
Prepared Atmosphere Generators.
SURFACE COMBUSTION CORPORATION
TOLEDO 1, OHIO

WIRE SPOOLING MACHINERY
ALL TYPES—ALL SIZES
ROBERT J. EMORY COMPANY
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MUSIC • SPRING • STAINLESS
SPECIALTY WIRE CO., Inc.
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Engineered Application of Heat in Continuous Materials Handling Systems
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MACHINERY FOR HIGH SPEED PRODUCTION
BRAIDERS CABLERS
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STRANDERS TAPING MACHINES
NEW ENGLAND BUTT COMPANY
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James Day (Machinery) Ltd. 90 Regent Street, London W1, England

GET THE BEST IN REELS
HOWSAM SPOOL COMPANY
AURORA • ILLINOIS
Exclusive Feature: "Pressure Pad" Fasteners. Patent applied for.

Phosphate Coating Chemicals

Phosphate coatings have for many years been recognized as the best easy way to bond paint and other organic finishes to steel and galvanized iron. They are effective because they provide excellent protection with a relatively thin and flexible paint film. In contrast, the multiple-coat paint system used in the pre-phosphate coating era was brittle, costly and lacking in protection.

★ ★ ★

Originally, phosphate coatings were utilized only when severest exposure conditions were encountered; but now, with processes adapted to small as well as large production, durability and lasting beauty are imparted to countless products in all industries.

★ ★ ★

On metal surfaces—usually, steel, iron, zinc, and aluminum—that have been freed from rust, oil and soil, phosphate coatings are formed by dipping the work into the coating baths, carrying it through the several sprays in a multi-stage power washer, or applying the coating solutions with a brush. The method to be used is determined by the type of work, its size and the number of pieces to be produced.

★ ★ ★

These coatings are described in a Technical Service Data Sheet, No. P-100-46, issued by **American Chemical Paint Company** Ambler, Pa., which is available upon request.

★ ★ ★

Electrotinning Copper Wire: A New Process — Part II
The Machine

(*Continued from page* 568)

started and immediately causes the capstan to rotate. Individual lines are put in motion by connecting their respective take-up reel drives; this in turn causes the supply reel to be rotated at the proper linear speed, aided by the interdrive; plating current is then automatically applied while the reel smoothly ac-

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celerates. Breakage or termination of a strand will set in motion a reverse cycle, beginning with disconnecting of take-up reel drive, applying a solenoid actuated brake and finally interrupting the plating current. Deceleration of both reels is again influenced by the interdrive and is accomplished without creating objectionable slackening of the strand.

★ ★ ★

The advantages of electrotinning copper wire have been set forth in the preceding Part I of this paper. Of great interest and deserving of further investigation, are results of a recent exploration of the possibilities of drawing pre-plated wire. It is established that plated wire can be re-drawn successfully at speeds of 5000 F.P.M. without impairing drawing efficiency. Good results are obtained by limiting the draft to approximately twelve dies of progressive B&S gauge reductions. Naturally, a sufficient amount of tin must be applied to the wire to be drawn if a product meeting A.S.T.M. specifications is to be produced. Such heavy coatings are obtained by reducing the plating speed to a minimum. Most tinned wires of the finer gauges must be soft annealed as well, and may be so processed by this Resistance Annealer after emerging from the drawing machine and prior to spooling. The economy of electrotinning wire at a large diameter and subsequent redrawing combined with annealing at high speed should be apparent. The finished product is bright in appearance and of good quality. Slight concession in operating speed may be in order if annealing is to be combined with the drawing operation. Electrotinning only large sizes may prove to cover most requirements of tinned products, and would simplify all phases of tinning operations currently required.

★ ★ ★

It is hoped that this paper, outlining the functional and constructional details of the new Electrotinning Machine, when considered together with the previous discussion of the chemistry involved, has served to present all pertinent facts about the process.

★ ★ ★

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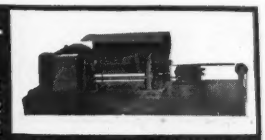
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Correction

On page 478 in an editor's note accompanying an article, a peculiar typographical error got by in that the words "Guts and Grinds" were used to identify that fine Norton publication "Grits and Grinds". It might at least have made more sense had the error been extended to the last word making it read, "Guts and Gumption". We hope our good friends at the **Norton Company** will take a liberal and lenient view of this erratum.

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Index to Advertisers

A

Ace Abrasive Laboratories 618
Acrometal Products Inc. 554
Aetna Standard Engineering Co., The 620
Ajax Electric Co. 600
Ajax Industrial Supplies, Inc. 631
American Chemical Paint Company 592
American Insulating Machinery Company 598
American Woodworking Co. 632
Angier Corporation, The 628
Apco Mossberg Company 628

B

Baird Machine Co., The 558
Balloffet-Vianney Wire Co., Inc. 631
Bethlehem Steel Company 534
Bick, Hans C., Inc. 634
Boulin, Victor J. 631
Boyd & Sons Mfg. Corp. 625
Bridge Mfg. Co. 549
Bronze Die Casting Co. 607

C

Carboloy Dept. of General Electric Co. ..... 586 and 587
Carl-Mayer Corp., The ..... 620 and 621
Carris Reels, Inc. 626
Ceilcote Company 632
Chase Brass & Copper 541
Chemsteel Construction Co., Inc. 632
Cleveland Tramrail Division of the Cleveland Crane & Engineering Co 553
Cochaud Wire Die Corp. 631
Continental Steel Corporation 627
Cook Mfg. Co. 624

D

Danforth Co., C. W. 632
Davis Electric Co. 546
Durant Mfg. Co. 622
Durkee Mfg. Co. 625
Dykrex Corporation of America—Roos Tool & Mfg. Div. 623

E

Eastern Carbide Corp. 627
Eisler Engineering Co., Inc. 632
Electric Furnace Company ..... Back Cover
Elgin National Watch Co., Abrasives Div. 557
Emory, Robert J. Company 632
Entwistle, James L., Co. ..... 564 and 601
Erie Iron & Supply Corp. 632

F

Fatigue of Materials Laboratory 634
Federal Mfg. Co. 598
Fenn Mfg. Co., The 556
Fidelity Machine Co., Inc. 596
Firth Sterling, Inc. 533
Fort Wayne Wire Die, Inc. 631

G

Gerber, J. & Co., Inc. 619
Glader, Wm. Machine Works 597
Glass Fibers, Inc. 540
Groma Trading Corp. 628

H

Harper Electric Furnace Corp. 604
Haskell-Dawes Machine Co., Inc. 625
Haveg Corporation 633
Heany Industrial Ceramic Corp. 626
Heineman Corp., Oscar 629
Heil Process Equipment Corp. 606
Hoosier Wire Die, Inc. 631
Howsam Spool Company ..... 632-633 and 634
Hughesville Machine & Tool Company 613

I

Imhoff, Wallace G. Co. 634
Indiana Wire Die Company 631
Industrial Ovens, Inc. 632
International Paper Company, Container Division 555

J

Johnson Steel & Wire Co., Inc. 590

K

Kelly Wire Die Corporation 631
Keystone Steel & Wire Company 593
Kilmer, M. D. & Co. 629

L

Lancaser, Allwine & Rommel 634
Lewis, K. B. 634
Lewis Machine Company, The 603
Lundahl Corporation 614

M

Magnus Chemical Co., Inc. 539
Maillefor, S. A. 612
Malin & Company, The 627
Marshall-Richards Machine Co., Inc. 535
Mason Can Company 629
McCaskie, Wm., Inc. 629
Metal Carbides Corporation 542
Metal and Thermit Corporation 622
Mettler Machine Tool, Inc. 605
Micro Products Company 589
Miller, R. H. Co., Inc. 552
Milton Machine Works, Inc. 591
Montgomery Co., The 627
Morgan Construction Company ..... Front Cover
Morrison Industries, Inc. 633
Mossberg Pressed Steel Corp. 617
Murex, Ltd. 609

N

National Machinery Exchange 633
National Research Co. 630
National Rubber Machinery Co. 602
National Waterproof Papers, Inc., Crepe-Kraft Div. 624
Naugatuck Chemical Div., U. S. Rubber Company 551
New England Butt Company 632
New England Lacquer Co. 619
New England Wire Die Co. 631
Niles Steel Products Div., Republic Steel Corp. 537
Nilson, A. H. Machine Co., The 599
Nopco Chemical Co. 608
North Anson Reel Co. 538
North Waterford Spool Co. 630
Norton Co., The 621

P

Pacific Coast Borax Company 623
Parkin Chemical Co., The 615
Pennsylvania Salt Mfg. Co. 550
Pittsburgh Cut Wire Company 610
Pittsburgh Steel Company 543
Platt Brothers & Co., The 632
Porter, H. K., Inc. 630
Pourtier Freres, Ets. 616

R

Rockwell, W. S., Co. 618
Roebling's, John A. Sons Co. 547
Roll-A-Reel 630
Royle, John & Sons 594
Rusch Wire Die Corporation 631

S

Scott Testers, Inc. 633
Scudder, E. J. Foundry & Machine Co. 633
Sjogren Tool and Machine Co., Inc. 604
Sleeper & Hartley, Inc. 633
Solar Compounds Corporation 560
Specialty Wire Co., Inc. 632
Solomon, Michael 633
Standard Industrial Compounds Co., Inc. 545
Standard Machinery Co., The 559
Standard Mill Supply Co. 632
Steel Equipment Co. 616
Surface Combustion Corp. 632
Swift & Company 611
Syncro Machine Company 544

T

Trauwood Engineering Co. 633

V

Vascoloy-Ramet Corporation 562
Vaughn Machinery Company 548

W

Wardwell Braiding Machine Co. 595
Warner Company 628
Waterbury Farrel Foundry & Machine Co. 536
Watson Machine Company ..... Inside Back Cover
Wayne Wire Die Co. 631
Wean Equipment Corporation 569
Wickwire Brothers, Inc. 626
Wilson, Lee Engineering Co., Inc. ..... Inside Front Cover
Wire & Textile Machinery, Inc. 626

Y

Youngstown Sheet & Tube Company, The 561

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Murex, Ltd., Rainham, England
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tantalum Carbide
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

WHERE TO BUY, Continued

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Murex, Ltd., Rainham, England.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIES—Tungsten Carbide
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Murex, Ltd., Rainham, England.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS & TRAVERSES—Flange Steel
Entwistle, Jas. L. Co., Providence, R. I.
Niles Steel Products Division, Republic Steel Corporation, Niles, Ohio

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., The, Paterson, N. J.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Metal Fatigue—Fatigue of Materials Laboratory, Princeton, N. J.
Wire Mill—Lewis, Kenneth B., Worcester, Mass.
Zinc—Imhoff, Wallace G., Co., No. Highlands, Calif.

EQUIPMENT—Insulation Testing
Davis Elec. Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire
Interlocking Fence Co., Morton, Ill.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Company, The, Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, Detroit, Mich.
Morrison Industries, Bedford, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Rockwell, W. S. Co., Fairfield, Conn.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Michigan Oven Co., Detroit, Mich.
Morrison Industries, Bedford, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Electric
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Rockwell, W. S. Co., Fairfield, Conn.
Trauwood Engineering Co., The, Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, Detroit, Mich.
Surface Combustion Corp., Toledo, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Pot (oil, gas, electric)
Ajax Electric Co., Inc., Philadelphia, Pa.
Holden, A. F., Co., The, Detroit, Mich.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F. Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Michigan Oven Co., Detroit, Mich.
Morrison Industries, Bedford, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

GALVANIZING EQUIPMENT—
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOOKS—Pickling & Liming
Bronze Die Casting Co., Pittsburgh, Pa.
Heil Process Equipment Corp., Cleveland, Ohio.
Youngstown Welding & Eng'g. Co., Youngstown, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

IMPREGNATING MATERIALS—
Standard-Toch Chemicals, Inc., New York, N. Y.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Company, The, Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

INSULATING LACQUERING SYSTEMS
American Insulating Machine Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Glass Fibers, Inc., Toledo, Ohio
Heineman Corp., Oscar, Chicago, Ill.
Merrimac Paper Co., New York, N. Y.
New England Lacquer Co., E. Providence, R. I.
Solar Compounds Corporation, Linden, N. J.
Solar Varnish Corp., Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.
U. S. Rubber Co., Naugatuck Chemical Div., New York, N. Y.

INSULATING MATERIALS—Paper—For Electric Wire Cable.
Merrimac Paper Co., New York, N. Y.
Solar Compounds Corporation, Linden, N. J.
Solar Varnish Corp., Linden, N. J.

LACQUERS—For Electric Wire
New England Lacquer Co., E. Providence, R. I.
Solar Compounds Corporation, Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LATHES—Die Reaming
Carboloy Dept. of General Electric Co., Detroit, Mich.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

LUMBER—Wire Mill, Carload shipments for lagging and car blocking
North Anson Reel Co., No. Anson, Me.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Barbed Wire
Glader Machine Works, Chicago, Ill.
Wean Engineering Co., Cleveland, Ohio.

MACHINERY—Braiding
Fidelity Machine Co., Inc., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Solomon, Michael, New York, N. Y.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Brazing
Eisler Engineering Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Federal Manufacturing Co., Wallingford, Conn.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans
(See Machinery—Wind-Up)

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.

MACHINERY—Coilers
Boyd & Sons Manufacturing Corp., Philadelphia, Pa.
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Providence, R. I.
Morgan Construction Co., Worcester, Mass.
National Machy. Exch. (used) New York, N. Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Euipment Corp., Cleveland, Ohio
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Cold Heading
(See Cold Headers)

MACHINERY—Copper Wire Drawing and Rolling
Aetna-Standard Engineering Co., Youngstown, Ohio
American Insulating Mach'y Co., Phila., Pa.
Fenn Manufacturing Co., The, Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
National Mach'y Exch. (Used) New York, N. Y.
Porter, H. K., Inc., Somerville, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Die Making
Carboloy Dept. General Electric Co., Detroit, Mich.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Dielectric Spark Testers
(See Machinery—Spark Testing)

MACHINERY—Draw Benches
Aetna-Standard Engineering Co., Youngstown, Ohio
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Edging
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Electrode Units
(See Machinery—Spark Testing)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Co., Detroit, Mich.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
National Rubber Machinery Co., Akron, Ohio
Royle, John, & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co., Morton, Ill.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Co., The, Hartford, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Forming Wire
Nilson, A. H., Machine Co., Bridgeport, Conn.

MACHINERY—Galvanizing
(See Galvanizing Equipment)

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Ets. Pourtier Frères, Romainville, France
Fidelity Machine Co., Inc., Philadelphia, Pa.
National Rubber Machinery Co., Akron, Ohio
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Solomon, Michael, New York, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Inc., Philadelphia, Pa.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Interlocking Fence Co., Morton, Ill.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Providence, R. I.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The, Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Youngstown Welding & Eng'g. Co., Youngstown, Ohio

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Youngstown, Ohio
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.

MACHINERY—Pre-Heater for Wire (for Extrusion of Plastics)
Industrial Ovens, Inc., Cleveland, Ohio
National Rubber Machinery Co., Akron, Ohio

MACHINERY—Re-Spoolers
American Insulating Mach'y Co., Phila., Pa.
Boyd & Sons Manufacturing Corp., Philadelphia, Pa.
Davis Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Providence, R. I.
Fidelity Machine Co., Inc., Philadelphia, Pa.
National Mach'y Exch. (Used), New York, N. Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
National Machy. Exch. (used) New York, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Engineering Co., Cleveland, Ohio

MACHINERY—Rubber Insulating
National Rubber Machinery Co., Akron, Ohio
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
National Rubber Machinery Co., Akron, Ohio
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Spark Testing
Davis Electric Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Providence, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Mettler Machine Tool, Inc., New Haven, Conn.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Spring Making
Carlson Company, The, New York, N. Y.
Lundahl Corp., Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening & Cutting
Fenn Manufacturing Co., The, Hartford, Conn.
Kilmer, M. D., & Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Haskell-Dawes Machine Co., Philadelphia, Pa.
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Aetna-Standard Engineering Co., Youngstown, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Steel Equipment Co., Cleveland, Ohio
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Swaging
Fenn Manufacturing Co., The, Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Tube Winders
Solomon, Michael, New York, N. Y.

WHERE TO BUY, Continued

MACHINERY—Take-Up and Pay-Out
Aetna-Standard Engineering Co., Youngstown, Ohio
Davis Electric Co., Wallingford, Conn.
Federal Manufacturing Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Marshall-Richards Machine Co., Inc., Trenton, N.J.
Standard Machinery Co., Mystic, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Ets. Pourtier Frères, Romainville, France
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Testing, Physical
Lundahl Corporation, Hartford, Conn.
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Marshall-Richards Machine Company, Inc., Trenton, N. J.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.
Federal Manufacturing Co., Wallingford, Conn.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply, Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Winding Wire
Federal Manufacturing Co., Wallingford, Conn.
Standard Mill Supply, Pawtucket, R. I.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
Kilmer, M. D., & Co., Cleveland, Ohio.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Youngstown, Ohio
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Fenn Manufacturing Co., The, Hartford, Conn.
Marshall-Richards Machine Co., Inc., Trenton, N.J.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mekaniska Verksbod, Morgårdshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
Kilmer, M. D. & Co., Cleveland, Ohio.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N. Y.

MACHINERY—Wrapping Straight Lengths and Tubing
Angier Corporation, The, Framingham, Mass.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Solomon, Michael, New York, N. Y.
Wire & Textile Machy.. Inc., Pawtucket, R. I.

MACHINERY—Wrapping Wire Coils
Angier Corporation, The, Framingham, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem, Rolling & Edging
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Co., Cleveland, Ohio.

NAILS—Wire
American Steel & Wire Co., Cleveland, Chicago, New York
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling, John A. Sons Co., Trenton, N. J.
Wickwire Brothers, Inc, Cortland, N. Y.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Morrison Industries, Bedford, Ohio
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

OVENS—Dehydrogenizing
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Industrial
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Rod Bakers
Carl-Mayer Corp., The, Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.
Morrison Industries, Bedford, Ohio

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Morrison Industries, Bedford, Ohio

PAINT—Acid Proof
Ceilcote Company, Cleveland, Ohio.
Standard-Toch Chemicals, Inc., New York, N. Y.

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.
Solar Compounds Corp., Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Angier Corporation, The, Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

PAPER—For Coil Wrapping and Corrosion Prevention
Angier Corporation, The, Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Crepe-Kraft Company, The, Division National Waterpreof Papers, Inc., Newark, N. J.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See Wind-up and Unwind Systems)

PHOSPHATE COATING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Bronze Die Casting Co., Pittsburgh, Pa.
Youngstown Welding & Eng'g. Co., Youngstown, Ohio

PICKLING TANK LININGS—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

PNEUMATIC CYLINDERS—
Entwistle, Jas. L. Co., Providence, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio.

PRESSES—Hydraulic and Mechanical
Standard Machinery Co., Mystic, Conn.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

REEL AND TENSION STANDS—
Davis Electric Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Kilmer, M. D., & Co., Cleveland, Ohio
Roll-A-Reel, Cincinnati, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Roll-A-Reel, Cincinnati, Ohio.
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Drawn Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.

REELS & SPOOLS—Collapsible
Entwistle, Jas. L. Co., Providence, R. I.

REELS & SPOOLS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Mason Can Company, East Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.
North Anson Reel Co., No. Anson, Me.

REELS & SPOOLS—Wooden
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co., Pine River, Minn.
North Anson Reel Co., No. Anson, Me.
No. Waterford Spool Co., No. Waterford, Me.

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
McCaskie, Inc., Wm., Westport, Mass.
North Anson Reel Co., No. Anson, Me.

REELS—Non Returnable
(See Listings under REELS & SPOOLS—Shipping & Shop)

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
McCaskie, Inc., Wm., Westport, Mass.

REELS—Takeoff
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
McCaskie, Inc., Wm., Westport, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio
North Anson Reel Co., No. Anson, Me.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio

REELS—Wire Drawing
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio

WHERE TO BUY, Continued

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Dykrex Corp., Roos Tool & Mfg. Div., Newark,
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.
North Anson Reel Co., No. Anson, Me.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

RESISTANCE HEATING—Annealing Patenting, Etc.
Trauwood Engr. Co., Cleveland, Ohio.

ROD BAKERS—
(See Ovens—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio.
U. S. Steel Co., N. Y., N. Y.

RODS—Wire—Non-Ferrous
American Brass Co., The, Waterbury, Conn.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Erie Iron & Supply Corp., Erie, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Company, Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
American Steel & Wire Company, Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's John A., Sons Co., Trenton, N. J

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
(See Compounds—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See Compounds—Rust Preventing)

SALTS—Heat Treating, Descaling, etc.
Holden, A. F., Co., The, Detroit, Mich.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

SOAPS—Industrial and Wire Drawing
(See Compounds—Wire Drawing)

SODIUM—for Descaling
Holden, A. F., Co., The, Detroit, Mich.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

SPOOLS—(See Reels & Spools)

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Co., East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Art Wire and Stamping Co, Newark, N. J.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Ceilcote Company, Cleveland, Ohio.
Chemsteel Construction Co., Pittsburgh, Pa.
Heil Process Equipment Corp., Cleveland, Ohio

TANKS—Steel
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TINNING PROCESS—
Metal & Thermit Corp., New York, N. Y.

TINSEL—Cords, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL—Electric Resistance
(See: Tinsel—Electric Conductor)

TINSEL—Lame, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Wire
(See: Tinsel—Electric Conductor)

TOOLS—Spring Forming
Lundahl Corporation, Hartford, Conn.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

TUBE BENDERS AND FORMERS—
Kilmer, M. D., & Co., Cleveland, Ohio

TURKS HEADS—
Fenn Manufacturing Co., The, Hartford, Conn.

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—for Electric Wire
N. E. Lacquer Co., E. Providence, R. I.
Solar Varnish Corporation, Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIND-UP AND UNWIND SYSTEMS—
American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.
Federal Manufacturing Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

WIRE—Aluminum
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Malin & Co., Cleveland, Ohio
Seneca Wire & Manufacturing Co., Fostoria, Ohio

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.

WIRE—Brush
Groma Trading Corp., New York, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Erie Iron & Supply Corp., Erie, Pa.
Gerber, J., & Co., Inc., New York, N. Y.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's John A., Sons Co., Trenton, N. J.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Coppered
Gerber, J., & Co., Inc., New York, N. Y.

WIRE—Electric
American Brass Co., The, Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., Cleveland, Ohio

WIRE—Flat, Fine
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Groma Trading Corp., New York, N. Y.
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Forming
Art Wire and Stamping Co, Newark, N. J.

WIRE—Galvanized
Gerber, J., & Co., Inc., New York, N. Y.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Continental Steel Corp., Kokomo, Ind.
Gerber, J., & Co., Inc., New York, N. Y.
Groma Trading Corp., New York, N. Y.
Johnson Steel & Wire Co., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
U. S. Steel Co., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Cleveland, Ohio
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio
Seneca Wire & Manufacturing Co., Fostoria, Ohio
Specialty Wire Co., Inc., Worcester, Mass.

WIRE—Nickel Silver and Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Groma Trading Corp., New York, N. Y.
Malin & Co., Cleveland, Ohio.
Chase Brass & Copper Co., Waterbury, Conn.

WIRE—Non-Ferrous to Specifications for Special Purposes
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Cleveland, Ohio
Chase Brass & Copper Co., Waterbury, Conn.
Groma Trading Corp., New York, N. Y.
North American Philips Co., Inc., Allied Products Division, New York, N. Y.

WIRE—Oil Tempered
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Spring
American Brass Co., The, Waterbury, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
Specialty Wire Co., Inc., Worcester, Mass.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Firth Sterling, Inc., Pittsburgh, Pa.
Specialty Wire Co., Inc., Worcester, Mass.

WIRE—Steel—Also Coppered and Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Erie Iron & Supply Corp., Erie, Pa.
Gerber, J., & Co., Inc., New York, N. Y.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Art Wire and Stamping Co., Newark, N. J.
Erie Iron & Supply Corp., Erie, Pa.
Pittsburgh Cut Wire Co., Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Tungsten
North American Philips Co., Inc., Allied Products Division, New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Weaving (Non-Ferrous)
American Brass Co., The, Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Groma Trading Corp., New York, N. Y.

WRAPPING PAPER—Creped
Angier Corporation, The, Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

YARNS & TAPES—
Glass Fibers, Inc., Toledo, Ohio

YARN TESTERS—
Heineman Corp., Oscar, Chicago, Ill.
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

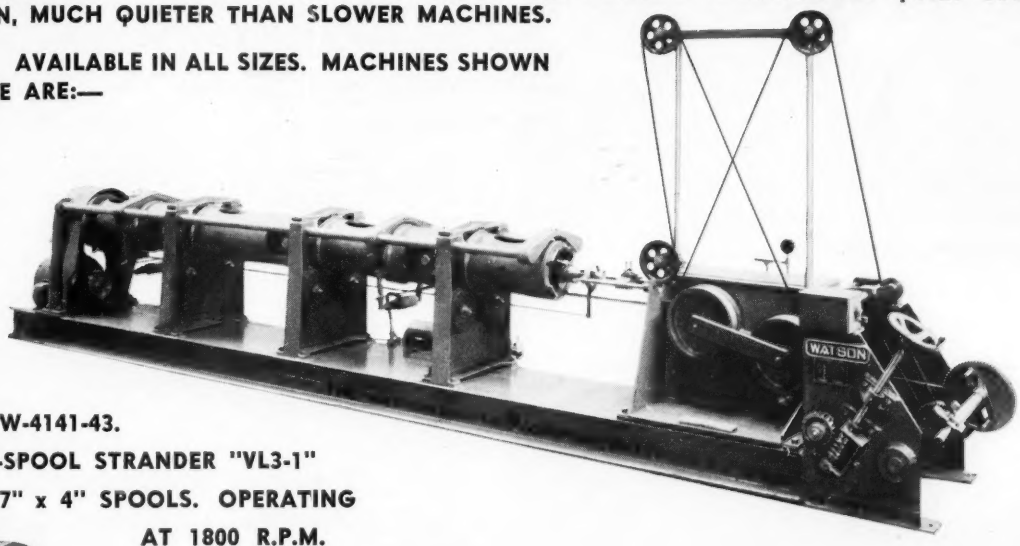
EXTRA HIGH SPEED "VL" TYPE STRANDERS

U.S. PATENTS 2,270,093 & 2,442,817. OTHERS PENDING & ALLOWED

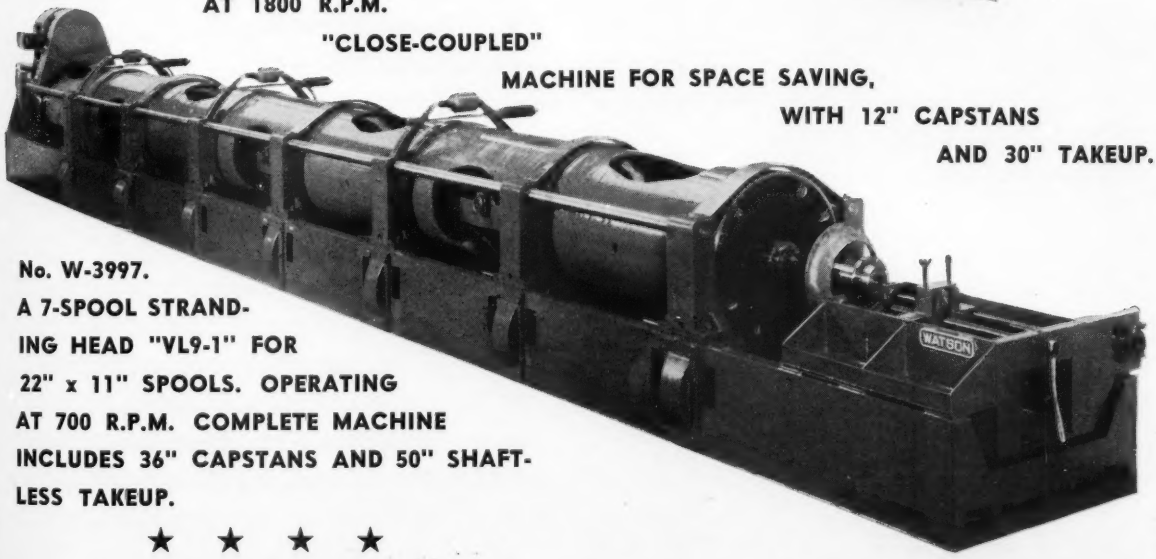
THIS LATEST PATENTED DESIGN COMBINES HIGHEST POSSIBLE MACHINE SPEEDS AND LOADING TIME REDUCTION RESULTING IN MACHINE UNITS OF UNPARALLELED PRODUCTIVITY.

OUTSTANDING ADVANTAGES OF THIS OVER OTHER DESIGNS ARE: 1—"SHAFTLESS" SELF-LOCKING PATENT BOAT CRADLES WITH INTEGRAL TENSIONS — NO LOOSE PARTS WHATSOEVER. 2—LOWER WIRE AND CORE LEAD ANGLES. 3—EXTREMELY QUIET OPERATION, MUCH QUIETER THAN SLOWER MACHINES.

AVAILABLE IN ALL SIZES. MACHINES SHOWN HERE ARE:—



No. W-4141-43.
A 7-SPOOL STRANDER "VL3-1" for 7" x 4" SPOOLS. OPERATING AT 1800 R.P.M.
"CLOSE-COUPLED" MACHINE FOR SPACE SAVING, WITH 12" CAPSTANS AND 30" TAKEUP.



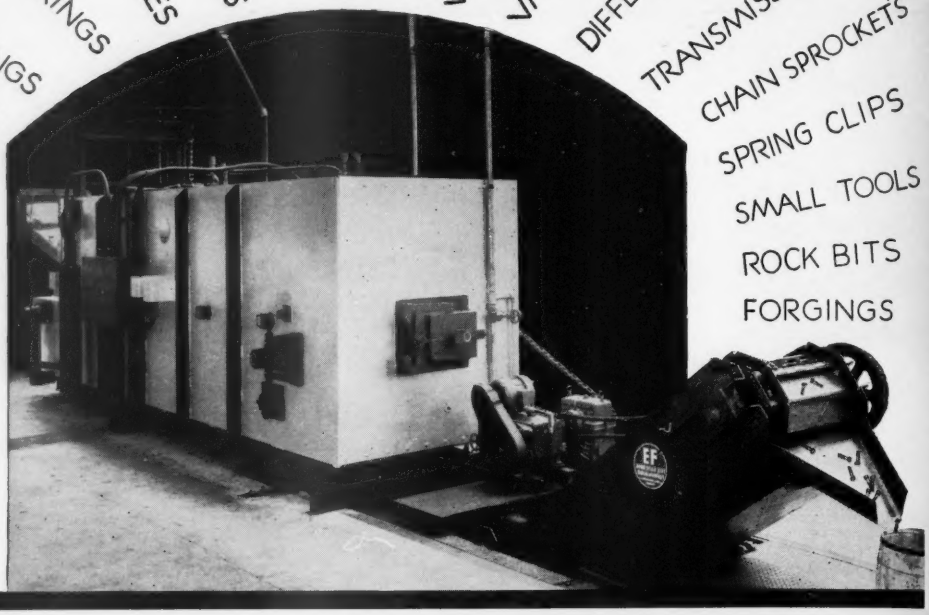
No. W-3997.
A 7-SPOOL STRANDING HEAD "VL9-1" FOR 22" x 11" SPOOLS. OPERATING AT 700 R.P.M. COMPLETE MACHINE INCLUDES 36" CAPSTANS AND 50" SHAFTLESS TAKEUP.

★ ★ ★ ★

Request Machine Bulletin. Test Run Inspections Invited. Users References Available.

BALLS FOR BEARINGS
SPRING PLATES
CAP SCREWS
PINIONS
BOLTS - NUTS
RIVETS
WRENCH PARTS
VALVE SPRINGS
DIFFERENTIAL GEARS
TRANSMISSION GEARS
CHAIN SPROCKETS
SPRING CLIPS
SMALL TOOLS
ROCK BITS
FORGINGS
ROLLER BEARINGS
TRACTOR LINKS
AIRCRAFT PARTS
WASHERS
ENGINE PARTS
COIL SPRINGS

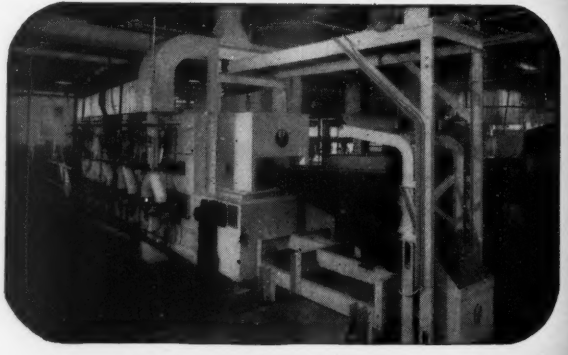
ELECTRIC EF FURNACES FUEL FIRED



For Hardening Small Parts

Uniformly — Scale-free — Continuously 175 to 2000 lbs. per hour

The E F chain belt conveyor furnace is one of the most satisfactory continuous heating units yet devised for scale-free hardening, carbon restoration and non-decarb heat treating small and medium size parts. The material is loaded onto a rugged heat resisting cast link conveyor belt; carried through the furnace; heated uniformly to proper temperature; automatically quenched and discharged. No pans or trays are needed. Hundreds in daily operation prove the dependability and efficiency of our deisgn. 11 standard sizes. Capacities to 2000 lbs. or more per hour. Gas, oil or electrically heated. Furnished complete with any desired feeding or discharging equipment. Write for folders describing our chain belt or other production furnaces.



E F Chain Belt Conveyor Furnace, Radiant Tube Gas Heated, Showing Labor Saving Loading Arrangement
(View at the Top) Electrically Heated Furnace Showing Automatic Quench and Discharge.

EF

Gas-Fired, Oil-Fired and Electric Furnaces
for any Process, Product or Production

THE ELECTRIC FURNACE CO.

WILSON ST. at PENNA. R. R. *Salem - Ohio*